Eastern Shore Math Consortium II

Final Evaluation Report

November 21, 2008

TABLE OF CONTENTS

1 INTRODUCTION

The Eastern Shore Math Consortium (ESMC) is a partnership of six Eastern Shore school systems (Caroline, Dorchester, Kent, Somerset, Worcester and Wicomico), Salisbury University ("SU"), and the Maryland State Department of Education (MSDE). The consortium was developed in order to organize professional development opportunities that would increase teacher effectiveness in pedagogical and content-based areas. The consortium believes that teacher effectiveness strongly correlates with student achievement, and that improving teachers' content knowledge will lead to higher student test scores on the Maryland School Assessment (MSA). As the Consortium writes in its application for MSDE funding:

> *Low scores on the Maryland School Assessment (MSA) in mathematics by a large percentage of students in grades 4-8 have led the Eastern Shore Math Consortium (ESMC) to design a professional development project for 60 teachers of mathematics in those grades. The goal of the project is to raise student achievement on the MSA by deepening teacher content knowledge in mathematics and increasing the number of highly-qualified mathematics teachers.*

Wicomico County serves as the lead agency for the ESMC project, while representatives from each of the partners serve on a project Advisory Committee. The Advisory Committee meets several times per year in order to plan professional development opportunities. Since January 2006, the ESMC has received three separate two-year grants from MSDE through its Math Science Partnership (MSP) program. The grant addressed in this report, ESMC II, began in February 2007 and ended in September 2008. All of the ESMC grants operate on a Cohort model, where groups of teachers participate in professional development activities together. Two groups of teachers participate in each ESMC grant and each group is titled with a different Cohort number. Figure 1 illustrates the timeframe and Cohorts of each grant, as well as the nature of participants in each of the six Cohorts.

The goal of the ESMC II grant was to improve teacher effectiveness by providing participants with technology to use in their classrooms, such as SMART boards and document cameras, and engaging them in hands-on activities that they could adapt for their own classrooms. ESMC activities include an online discussion board, a five-day Summer Program, membership and attendance at a professional conference and organized daylong workshops addressing specific topics of interest to the participants. Cohort III and Cohort IV have approximately 30 participants from Caroline County, the Diocese of Wilmington, Dorchester County, Kent County, Somerset County, Wicomico County, and Worcester County. About three quarters of Cohort III teachers work in elementary school and about one-third teach middle school. In contrast, about half of Cohort IV teachers work in elementary schools and about half work in middle schools.

Figure 1: Grant Information Details

Grant	Grant Date	Cohort Name and Date		Nature of Participants
ESMC I	July '05 to Aug. '07	Cohort I	7/1/05–9/30/06	Middle School Teachers
		Cohort II	10/1/06–8/31/07	Middle School Teachers
ESMC II	Feb. '07 to Sept. '08	Cohort III	2/19/07–9/30/07	Elementary and Middle School Teachers
		Cohort IV	10/1/07–9/30/08	Elementary and Middle School Teachers
ESMC III	Dec '07 to Aug '09	Cohort V	12/24/07 – 6/30/08	Consists of participants from Cohorts I-III and math coaches who did not previously participate
		Cohort VI	7/1/08–8/31/09	Consists of members from Cohorts I-IV and math coaches who did not previously participate

Macro International ("Macro") has served as the external evaluator for all three ESMC grants. This report describes the methods and findings of Macro's evaluation of Year 2 of the second grant. Because the activities in each ESMC grant vary slightly, Macro has developed a specific logic model for each grant to serve as a framework for the evaluation reports. The logic model depicts the following categories for each ESMC grant: situation, inputs, and outcomes. One of the goals of the logic model is to ensure that ESMC's inputs and activities lead to outputs that will achieve the desired outcome of increased student scores on the MSA.

Figure 2 is an illustration of the logic model developed specifically for ESMC II. The first column on the left illustrates the *situation* that the grant is trying to address, which is that a large percentage of students on the Eastern Shore in grades 4-8 were achieving low scores on the MSA.
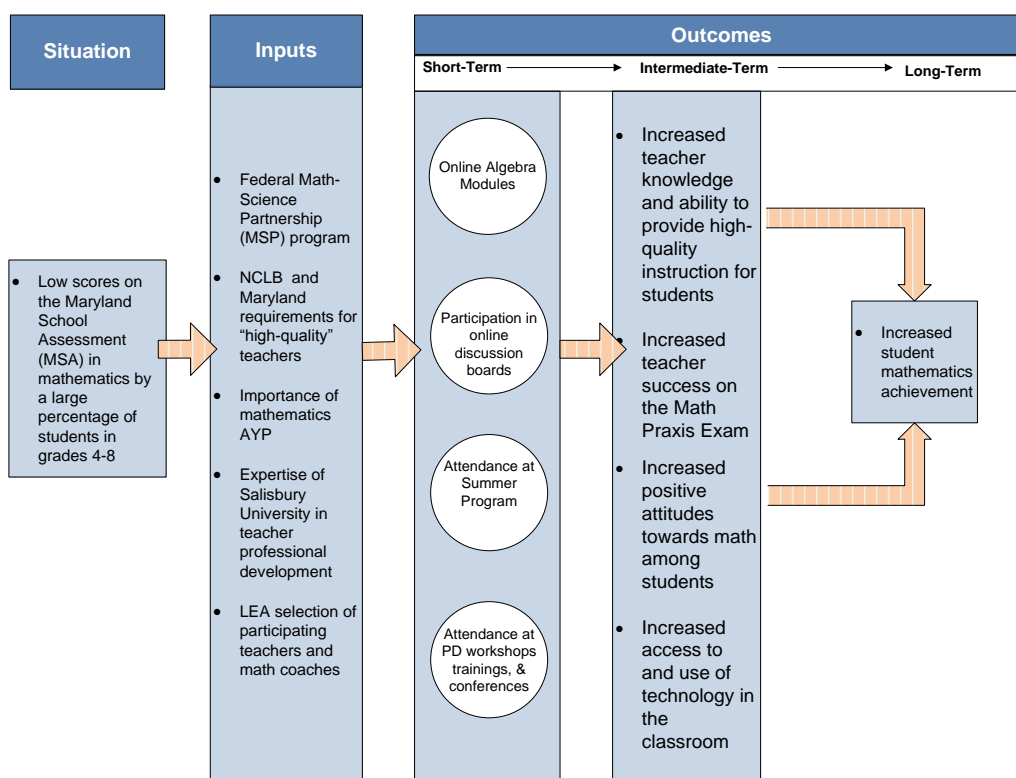
The second column identifies important *inputs* for the grant. Inputs include accountability measures, including No Child Left Behind's regulations regarding "high quality teachers" and the regulation for Maryland districts and schools to make Annual Yearly Progress (AYP) on student achievement measures. The other inputs are important resources from which the ESMC has drawn, such as SU's expertise in teacher professional development.

The final three columns show the grant's anticipated short-term, intermediate-term and long-term *outcomes*. Short-term outcomes deal with the grant's professional development activities. The short-term outcomes include ESMC-organized activities including an online discussion board facilitated by a SU professor, a five-day Summer Program, membership to the National and Maryland Councils of Teachers of Mathematics (NCTM and MCTM) and organized daylong workshops addressing specific topics of interest to the participants. The intermediate-term

outcomes identify modified or new behaviors, practices or policies that occur as result of what participants learn through ESMC. The intermediate outcomes of this grant include an increase in participants' mathematics knowledge, an increase in the number of teachers who pass the Praxis exam, increased positive attitudes towards math among students, and increased access to and use of technology in the classroom.

The final box on the right-hand side of the logic model illustrates that while short and intermediate-level outcomes are important, the overall goal of the grant is to improve student learning, and therefore, increase student mathematics achievement on the MSA.

Figure 2: Logic Model for Eastern Shore Math Consortium Grant II

Situation	Inputs	Outcomes		
		Short-Term	Intermediate-Term	Long-Term
• Low scores on the Maryland School Assessment (MSA) in mathematics by a large percentage of students in grades 4-8	• Federal Math-Science Partnership (MSP) program • NCLB and Maryland requirements for "high-quality" teachers • Importance of mathematics AYP • Expertise of Salisbury University in teacher professional development • LEA selection of participating teachers and math coaches	Online Algebra Modules Participation in online discussion boards Attendance at Summer Program Attendance at PD workshops trainings, & conferences	• Increased teacher knowledge and ability to provide high-quality instruction for students • Increased teacher success on the Math Praxis Exam • Increased positive attitudes towards math among students • Increased access to and use of technology in the classroom	• Increased student mathematics achievement

The second section of this report evaluates the primary grant activities for Cohort IV--participation in the online algebra modules, participation in the online discussion board, and attendance at the Summer Program. The third and fourth sections evaluate progress towards the intermediate and longer-term outcomes. The fifth and final section of the report summarizes evaluation findings.

Appendix 1 of this report specifically addresses progress made towards the stated goals, objectives, strategies, and activities described in the grant proposal. Progress towards these goals is described in the text of the report, but this appendix provides a more direct assessment of the extent to which the ESMC partnership has completed their proposed activities.

2 EVALUATION OF PROFESSIONAL DEVELOPMENT ACTIVITIES
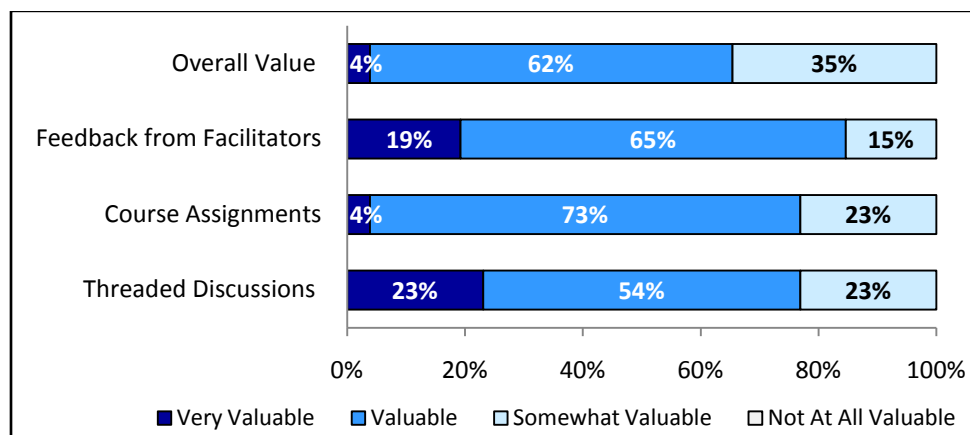
2.1 ONLINE ALGEBRA MODULES

In the spring of 2008, Cohort IV participants completed several online modules from an algebra course developed by MSDE. The module facilitator was responsible for reminding participants about assignments, monitoring participants' work, and providing them with feedback when necessary. Macro International collected data on these modules from participants through a written survey distributed at the beginning of the Summer Program (Appendix 2). The following is a summary of our findings.

2.1.1 Perceived Value of Online Algebra Modules

The survey asked participants to rate four aspects of the algebra modules (Figure 3). Overall, 66 percent of participants found the modules to be "very valuable" or "valuable". Eighty–four percent of participants said that the "feedback from facilitators" was "very valuable" or "valuable," while 77 percent of participants said the same about the "course assignments" and the "threaded discussions."

Figure 3: Perceived Value of Online Algebra Modules, Cohort IV, (N=26)

Macro also asked participants about the extent to which they agreed or disagreed with eight statements about the online algebra modules (Figure 4). Over 90 percent of participants "strongly agreed" or "agreed" with the following statements:

- The course work matched my level of knowledge and skills (96%)
- The facilitator demonstrated background knowledge and mastery of the course content (92%)

Between 70 and 90 percent of participants "strongly agreed" or "agreed" with the following statements:

- The course content was logically organized and sequenced (88%)
- The modules improved my understanding of algebra content (88%)

- The facilitator was responsive to questions and issues raised by others and me in the course (77%)
- The topics addressed were relevant to my interests and/or professional responsibilities (75%)

Only 15 percent of participants indicated that technical issues had interfered with their use of the modules.

Figure 4: Ratings of Online Algebra Modules, Cohort IV, (N=26)[1]
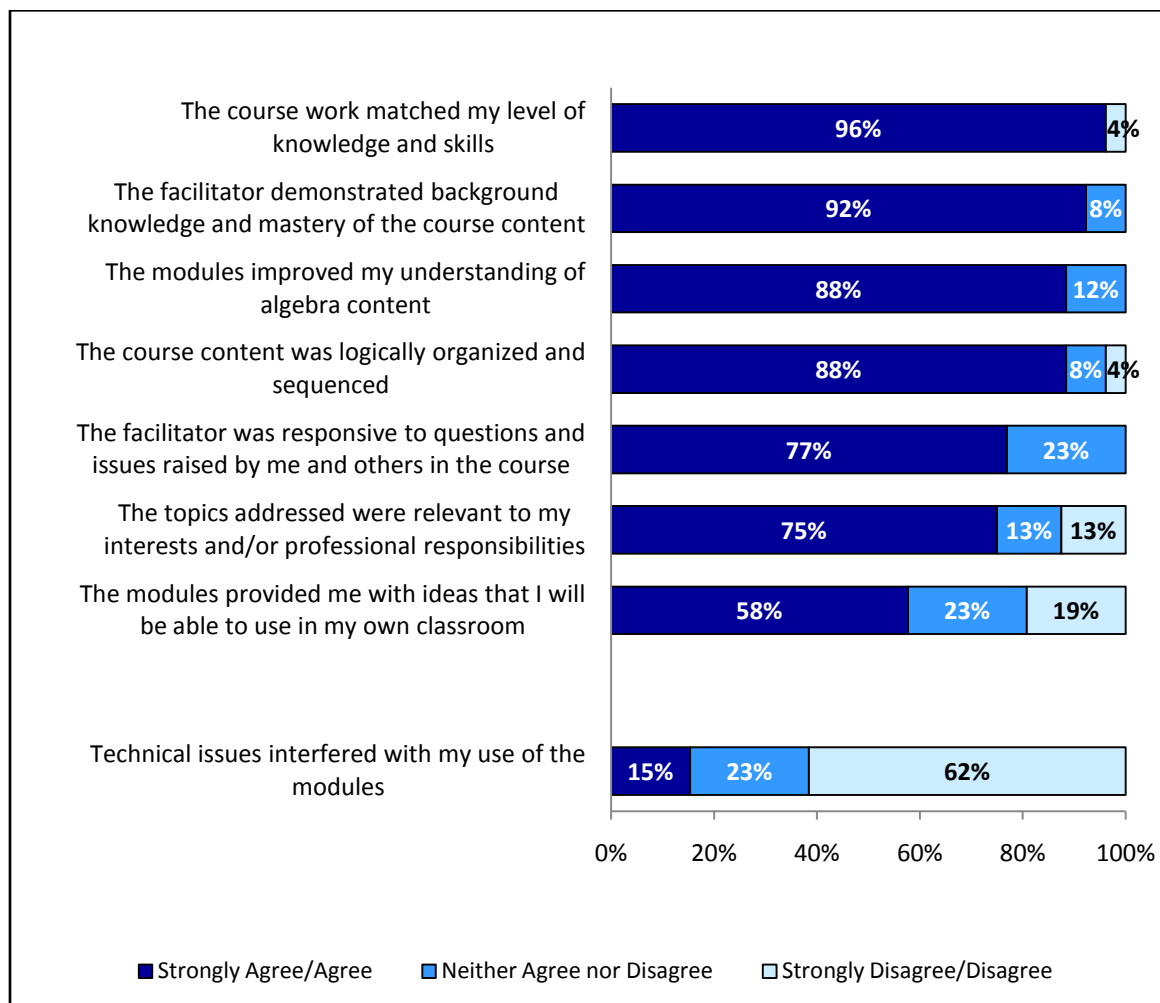
2.1.2 Participant Comments and Suggestions

The survey also asked participants to describe, in their own words, what they liked most about the online algebra modules. The most frequent comments from teachers were that the modules

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[1] The survey included five different response options: "Strongly Agree," "Agree," "Neither Agree nor Disagree," "Disagree," and "Strongly Disagree." For reasons of simplicity, these options were combined into three categories.

served as a good refresher/review of algebra content, allowed self-pacing, and provided them with ideas to use in the classroom. The comments that teachers provided fell into the following categories: format, feedback, pace, content, and teaching ideas.

- *Format*: Teachers noted that the online format was user friendly, the tutorial at the beginning and guided questions were helpful in preparing teachers for independent questions, and that the modules showed how to solve the problems rather than just the correct answer.

- *Pacing*: Teachers liked the ability to learn at their own pace and on their own schedule.

- *Content*: Teachers found the modules to be a good refresher and they found the content quality and detail to be appropriate and relevant to what they are teaching.

- *Feedback*: Teachers liked receiving immediate feedback when they asked questions.

- *Ideas*: Teachers said that the modules, particularly the lower level modules, gave them new ideas for teaching their students.
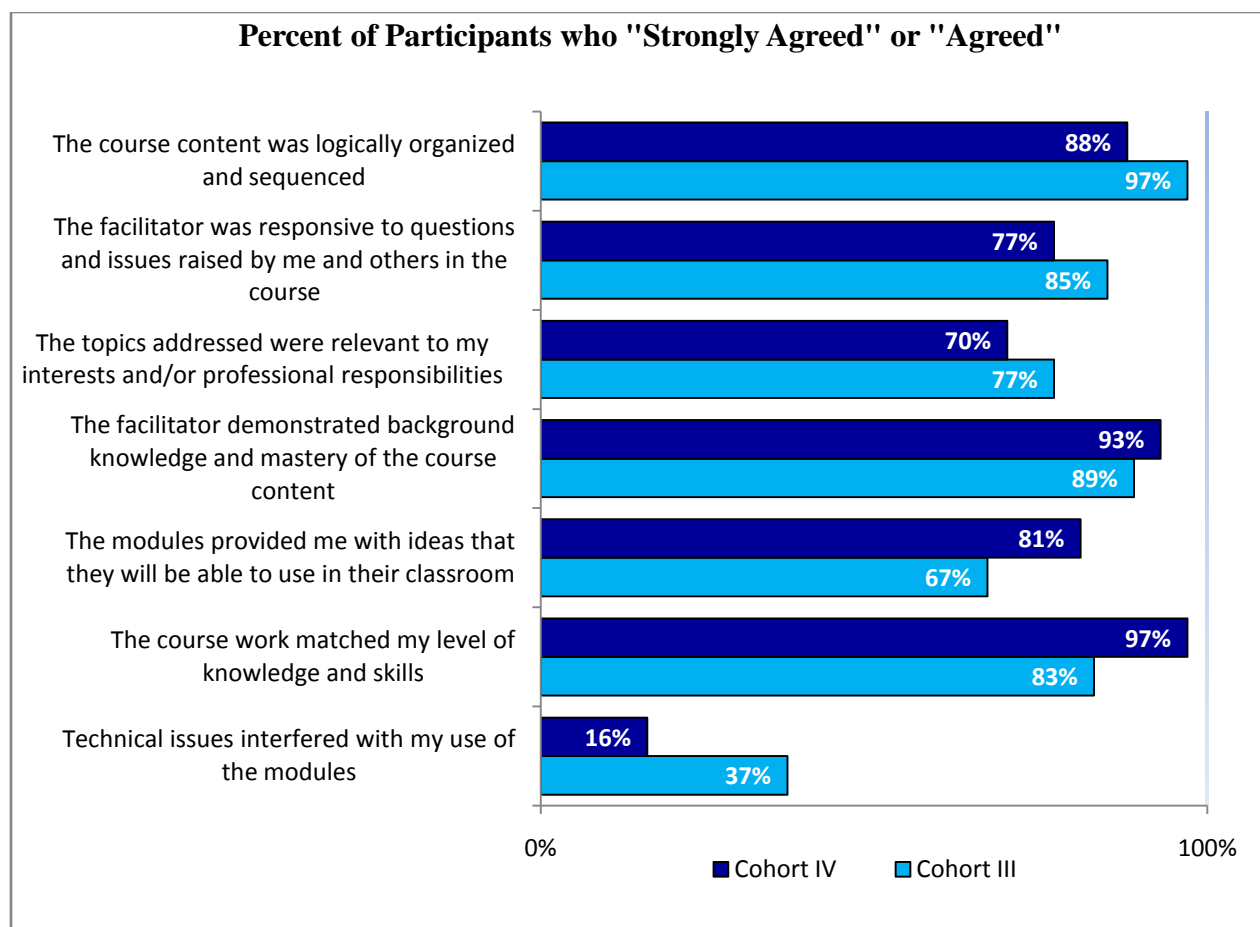
Six teachers also provided suggestions for improving the MSDE online modules. Two teachers commented that the webpage layout is confusing and it is hard to find the right module. Another two teachers commented that it would be better to have the content geared toward a teacher's particular grade level.

2.1.3   Comparison with Cohort III

Cohort III participants took the same online algebra modules as Cohort IV participants when they participated in the ESMC grant. The percentage of teachers who found the overall value of the modules to be "very valuable" or "valuable" fell from 76 percent in 2007 to 66 percent in 2008. In addition, as Figure 5 shows, Cohort III participants found that the modules were more logically sequenced and that the course assignments were more valuable than Cohort IV participants did. However, more Cohort IV participants felt that the modules aligned with teachers' skill level and helped generate classroom ideas amongst teachers. In addition, Cohort IV participants also felt that the facilitator was more responsive to teachers' questions.

The percentage of Cohort III participants who said in 2007 that technical issues interfered with their use of the modules was more than twice the percentage of Cohort IV who said the same thing (37% to 16%). This seems to indicate that the technological aspects of the modules may have improved over the past year.

Figure 5: Change in Perception about Online Algebra Modules between Cohort III and Cohort IV

Percent of Participants who "Strongly Agreed" or "Agreed"

The course content was logically organized and sequenced
- Cohort IV: 88%
- Cohort III: 97%

The facilitator was responsive to questions and issues raised by me and others in the course
- Cohort IV: 77%
- Cohort III: 85%

The topics addressed were relevant to my interests and/or professional responsibilities
- Cohort IV: 70%
- Cohort III: 77%

The facilitator demonstrated background knowledge and mastery of the course content
- Cohort IV: 93%
- Cohort III: 89%

The modules provided me with ideas that they will be able to use in their classroom
- Cohort IV: 81%
- Cohort III: 67%

The course work matched my level of knowledge and skills
- Cohort IV: 97%
- Cohort III: 83%

Technical issues interfered with my use of the modules
- Cohort IV: 16%
- Cohort III: 37%

0% — 100%

■ Cohort IV ■ Cohort III

2.2 ONLINE DISCUSSION BOARD

During the spring and summer of 2008, Cohort IV participants engaged in an online discussion board facilitated by Salisbury University professors. The professors assigned a series of weekly readings and asked participants to reflect on the readings by posting two comments in the beginning of the week and two comments at the end of the week. The facilitators monitored postings by discussion members, and posted their own comments and responses to messages.

After the first three weeks of the online discussion, Macro International administered a survey that asked participants to provide feedback on the value of this professional development activity. The following section describes the results of that survey.

2.2.1   Level of Participation

The survey asked participants how frequently they logged onto the discussion board and how much time they spent on the site. The amount of time teachers spent on the site ranged from zero

to four hours per week, with an average of three hours per week. The majority of teachers (70%) logged in "a few times a week" (Figure 6). Two teachers indicated that they logged in "less than once a week" and explained that they had computer issues that were not related to the discussion board itself, such as having to turn in their computer after the school year ended. The remaining teachers who logged in less than a few times a week cited technical issues, including the server being down for a few days and one teacher explained that her participation is limited by her school responsibilities.

Figure 6: Frequency of Participation in ESMC Discussion Board, Cohort IV (N=27)
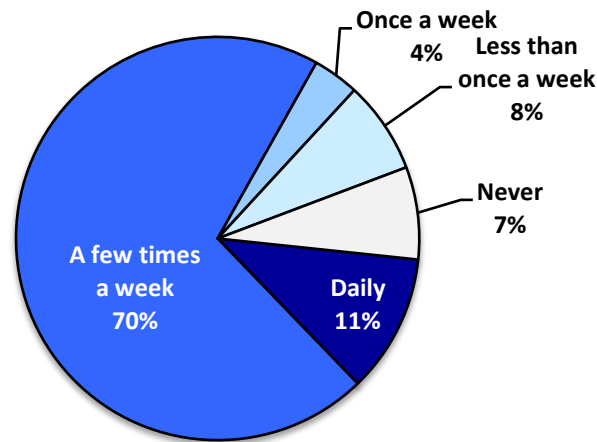
2.2.2   Perceived Value of Discussion Board

One of the survey items asked participants to rate various components of the discussion board on a four-point scale ranging from "very valuable" to "not at all valuable" (Figure 7). Sixteen percent of participants rated the overall activity "very valuable," and just over half (52%) rated it "valuable." The remaining 32 percent rated the activity "somewhat valuable."

Concerning the specific aspects of the online discussion board, 88 percent of participants indicated that the postings from other participants and from the facilitators were "very valuable" or "valuable." However, fewer respondents found the postings from the facilitator to be "very valuable" compared to the postings from other participants.

Respondents felt less positively about course assignments. Twenty percent indicated that these assignments were "very valuable," while about half (52%) found them to be "valuable."

Notably, none of the participants indicated that any aspects of the course were "not at all valuable."

Figure 7: Perceived Value of Discussion Board, Cohort IV (N=25)
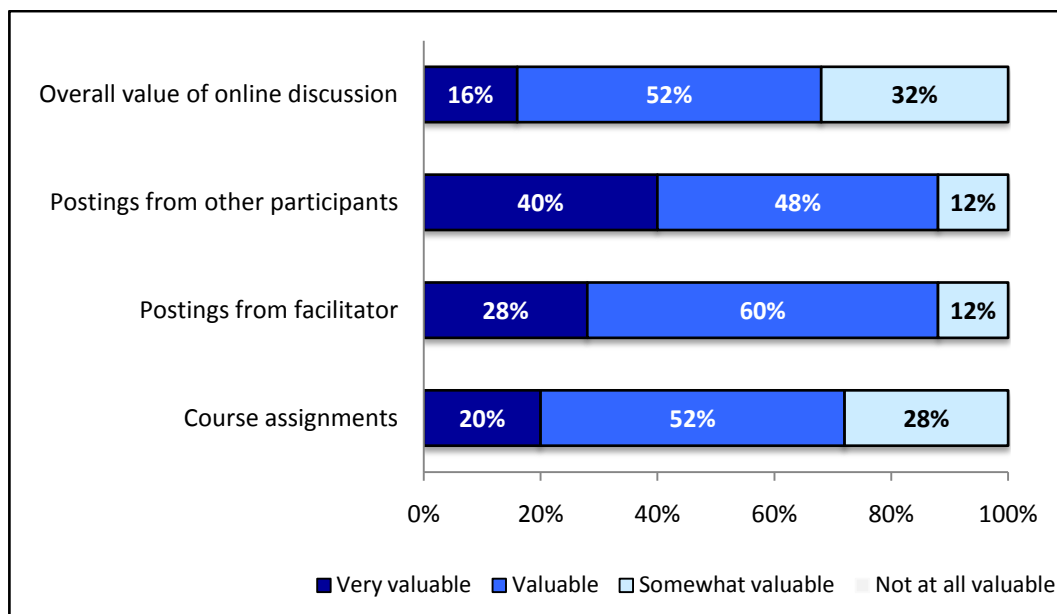
2.2.3 Participants' Attitudes Toward Discussion Board

Another item on the survey asked participants to rate their agreement with a series of statements about the discussion boards.[2] Figure 8 shows that more than 90 percent of respondents indicated that they "strongly agreed" or "agreed" that they felt comfortable posting comments and responding to other people's comments. However, respondents were not confident about their role in the discussion board: less than half (48%) "strongly agreed" or "agreed" that they were playing an important role in the discussion.

Although the majority of respondents found the assigned readings to be both interesting and relevant, more people found the articles to be relevant rather than interesting: 84 percent of respondents "strongly agreed" or "agreed" that the readings were relevant to them while only 64 percent "strongly agreed" or "agreed" that the readings were interesting.

Notably, very few respondents disagreed with any of these items, thus indicating that teachers generally find the discussion board useful. The only teacher who disagreed with any statement was one who "strongly disagreed" that the articles were interesting.

The remaining item asked about the extent to which technical problems interfered with participants' participation in the discussion. Half of participants (50%) indicated that they "strongly agreed" or "agreed" that technical problems interfered with their participation in the

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[2] The item included a six-point scale: "strongly agree," "agree," "slightly agree," "slightly disagree," "disagree" and "strongly disagree". For reasons of simplicity, these options were combined into four categories: "strongly agree/agree," "slightly agree," "slightly disagree," "disagree/strongly disagree."

discussion. When asked to comment about technical issues, one participant said that his/her discussion board "didn't show up" so (s)he could not participate in the discussions the first week; another person commented that (s)he had not yet received instructions for logging in.

Figure 8: Participants' Attitudes toward Discussion Board, Cohort IV (N=25)
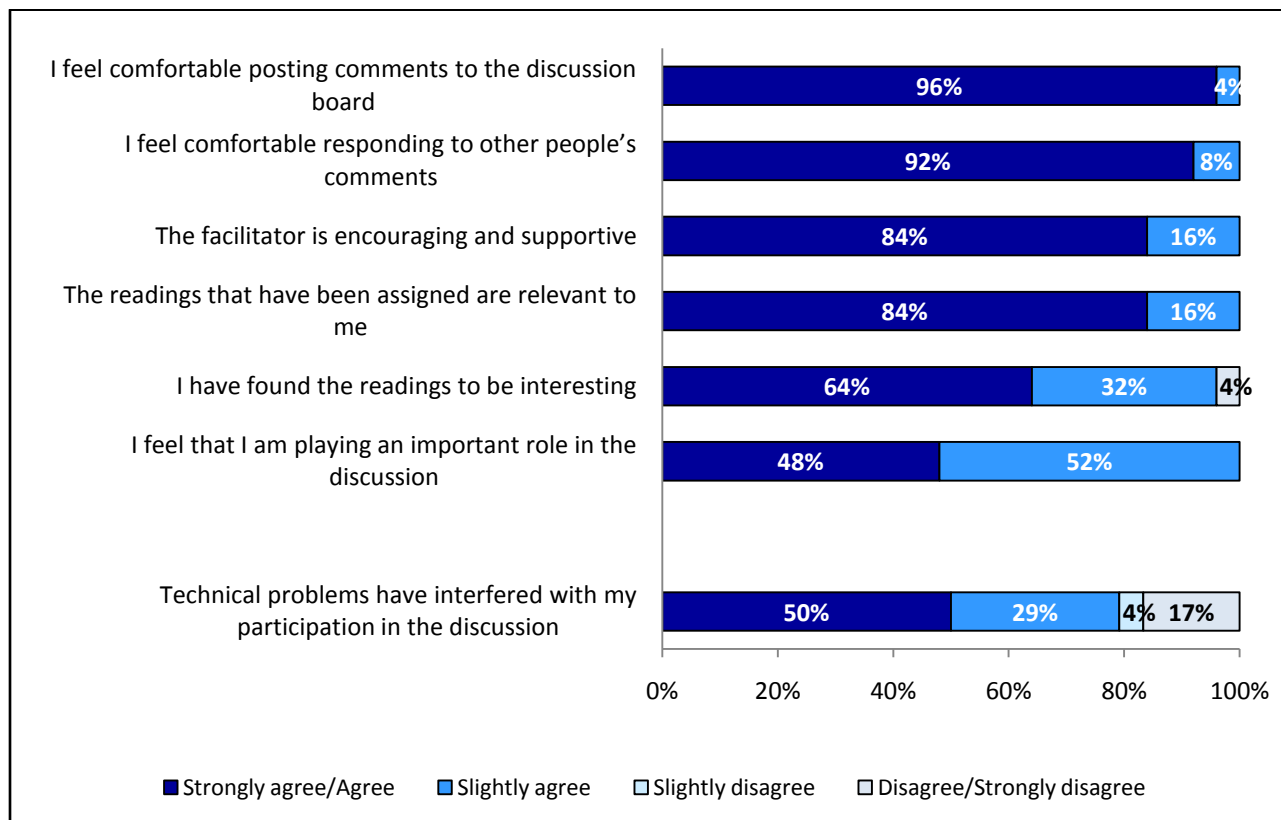
2.2.4   Other Feedback from Participants

When asked to explain what they liked most about participating in the online discussion, the majority of participants commented that they enjoyed hearing other teachers' thoughts and receiving ideas and strategies for their own classes. Other aspects of the discussion board that teachers liked included the following:

- Reading participants' viewpoints and descriptions of students' needs at different grade levels;
- Hearing other teachers' interpretations of the articles;
- The immediate feedback from participants and the facilitator; and
- The ability to learn at their own pace and convenience.

Teachers were also asked to make suggestions for how future online discussions could be improved. Suggestions included the following:

- The facilitator should pose a lead-in question to stimulate the discussion;

- The discussion topics should be related to the modules;
- The discussion should begin after school is out;
- The discussions should get forwarded to personal email accounts so that the teachers could keep in touch;
- The requirement about when participant comments need to be posted should be reassessed--teachers noted that four comments per week is manageable but the requirement to specifically post at the beginning and at the end of the week is difficult due to other time commitments;
- The articles should be less technical. One teacher noted that "the articles are relevant but very technical--the second article was better but it would be nice if they were more down to earth."

2.2.5   Comparison with Cohort III

Cohort III participants also participated in an online discussion board and took the same survey as Cohort IV. The data indicate that Cohort IV participants did not find the online discussion board as valuable as Cohort III participants. For example, the percentage of people who found the overall value of the discussion board to be *"very valuable"* or "valuable" fell from 88 percent in 2007 to 68 percent in 2008. However, Cohort III teachers took the survey after the discussion board ended, whereas the Cohort IV teachers took the survey less than halfway through. This difference in timing could have affected results. Figure 9 compares data from a series of questions about teachers' level of agreement regarding certain statements about the online discussion. One interesting finding is that only 48 percent of Cohort IV participants "strongly agreed" or "agreed" that they were playing an important role in the discussion, compared with 79 percent of Cohort III participants. In addition, 50 percent of Cohort IV participants said that technical problems interfered with their participation in the discussion, compared with 25 percent of Cohort III participants. However, because Cohort IV participants completed this survey after only three weeks of the discussion board, it is possible that some of the technical problems could have been login issues that were later resolved.

Figure 9: Change in Perception between Cohort III and Cohort IV

Percent of Participants who "Strongly Agreed" or "Agreed" with Statements about Discussion Board

The facilitator is encouraging and supportive — Cohort IV: 84%, Cohort III: 97%
I have found the readings to be interesting — Cohort IV: 64%, Cohort III: 89%
The readings that have been assigned are relevant to me — Cohort IV: 84%, Cohort III: 89%
I feel that I am playing and important role in the discussion — Cohort IV: 48%, Cohort III: 79%
Technical problems have interfered with my participation in the discussion — Cohort IV: 50%, Cohort III: 25%

■ Cohort IV   ■ Cohort III

2.3 SUMMER PROGRAM

During the summer of 2008, Cohort IV participants attended the annual ESMC 5-day Summer Program. The first two days took place on June 19-20 and the final three days took place on June 23-25. At the end of the last day, Macro International administered a survey (Appendix 3) to obtain feedback about participants' experience in the Summer Program.

2.3.1 Overall Quality

After the Summer Program, Macro administered a survey to assess participants' experience in this professional development activity. Based on the survey data, participants were generally satisfied with the Summer Program. Forty-six percent of participants in this year's Program rated it as "good," while 35 percent found it to be "excellent." The remaining 19 percent found it to be fair (Figure 10). In comparison with Cohort III, 28 percent fewer participants found the Program to be "excellent."

Figure 10: Perceived Summer Program Quality, Cohort IV (N=26)
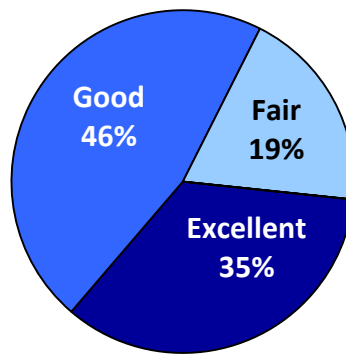
2.3.2 Summer Program's Pace and Length

Survey data also indicated that some participants were not completely satisfied with the pace of this year's Program. Half of the participants thought that the pace was "just right," while 46 percent thought it was "too slow" (Figure 11). In an open-ended question about what participants would like to improve for a future Summer Program, about 41 percent of participants expressed that the discussions were too in-depth and that some of the activities took too long. As a result, some explained that they lost focus. This feedback could be the reason that many participants found the Program to be too slow. In addition, many of the participants who thought the Program was too slow also indicated that the Program was "too long." Overall, 33 percent of participants indicated that the program was "too long."

Figure 11: Workshop Pace and Length, Cohort IV (N=26)
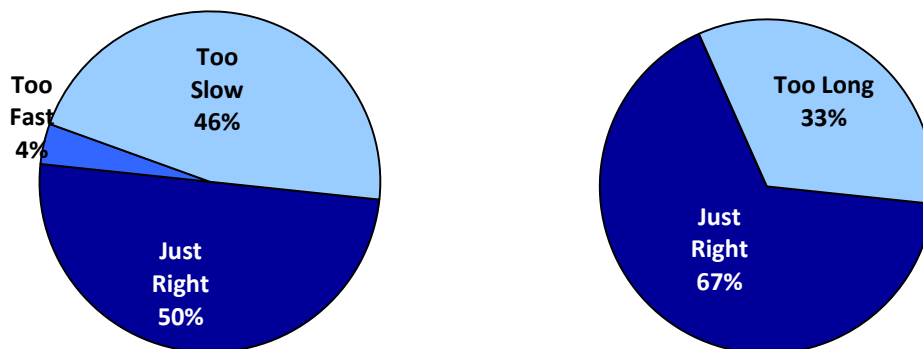

2.3.3   Content

When asked about the relevance of the topics covered during the summer program, 32 percent of participants indicated that they "strongly agreed" that the topics were relevant to them (Figure 12). One of the reasons that the remaining 68 percent only "agreed" or "disagreed" could have been because the content was not always grade appropriate. About ten participants expressed that they would have liked to break more into groups based on grade level because some of the activities were not appropriate for their particular grade level. In addition, two participants stated that they would have liked the content to be simpler and easier to understand.

Figure 12: Topics Were Relevant; Cohort IV (N=25)
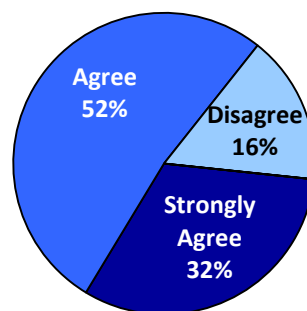
The majority of teachers (89%) indicated that they "learned a lot" or "learned some" about every content topic on the agenda. The topic on which the participants learned the most was "division and multiplication of fractions" and "probability". The two topics that participants seemed to learn the least about were "word problems" and "rational numbers." Figure 13 summarizes participants' feedback on these activities.

Figure 13: Level of Learning on Each Content Topic; Cohort IV[3]
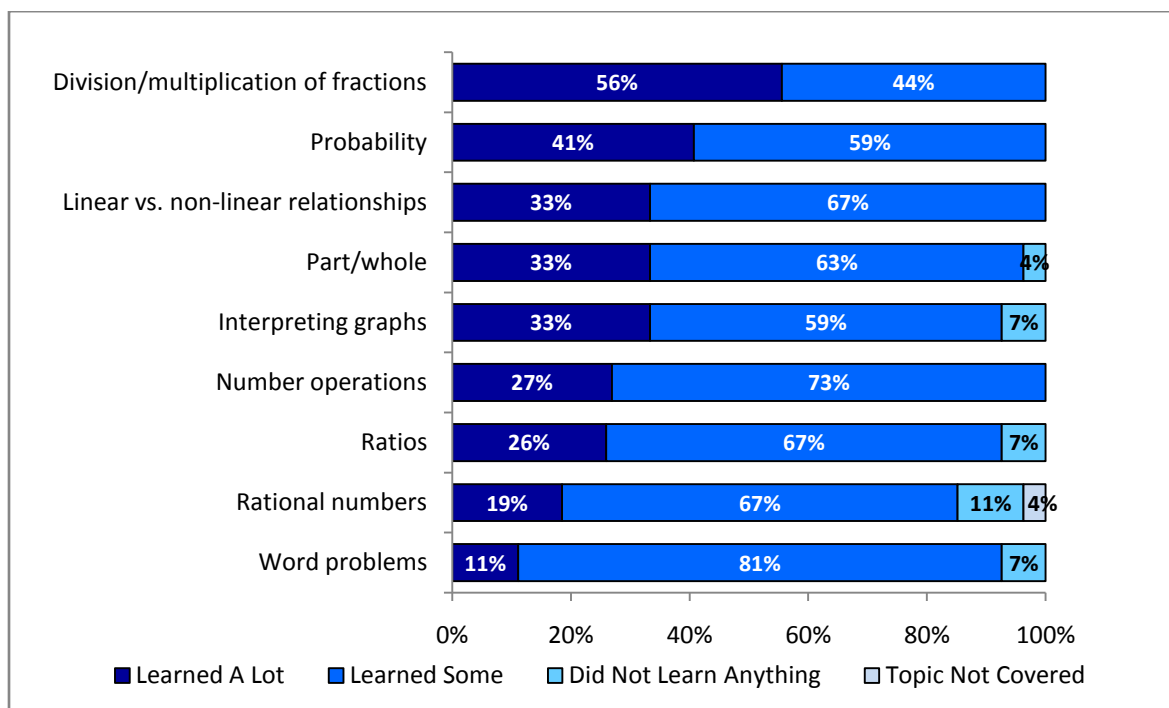
In addition to specific content topics, Macro asked participants to indicate how much they learned about different strategies to improve their teaching. The two strategies that participants learned the most were how to use manipulatives in mathematics instruction and how to engage students through hands on activities. Likewise, in an open-ended question asking participants to indicate their favorite aspect of the Summer Program, more than one-third of participants cited "hands on activities" and more than one-third specifically mentioned "manipulatives."

2.4 ADDITIONAL SUPPORT AND FOLLOW UP ACTIVITIES

In April 2008, Cohort III teachers completed a survey to evaluate different elements of their ESMC experience (Appendix 4). One of the questions asked about the types of support that teachers had received to help them implement what they had learned in their Summer Program (Table 1). The majority of participants (76%) indicated that they communicated with other project participants outside of the ESMC sponsored workshops. In addition, the majority of participants (68%) indicated that they received further training on the technological resources provided to them through the ESMC grant. More than half of participants (56%) also indicated that they received feedback from people who had observed their lessons.

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[3] Due to rounding, not all numbers add up to 100%

Table 1: Additional Support Cohort III Teachers Received During the School Year after their Summer Program, Cohort III, N=25

What types of support have you received this school year to help you implement what you learned last summer?	Response Percent[4]
Communication with other project participants through other means (e.g., e-mail or online discussion)	76%
Further professional development on using the technological resources you received	68%
Feedback based on observations of your lessons	56%
Follow-up meetings with other project participants within your district	40%
Follow-up meetings with other project participants in other districts	24%
Support from colleagues within district	8%

Another question asked teachers to specify what other types of ongoing support would have made it easier for them to apply what they learned during ESMC. Some responses included:

- Organizing more technology workshops.
- Organizing an ongoing online discussion to share ideas and discuss what worked in the classroom
- Continuing to organize more professional development opportunities throughout the year
- Providing opportunities to continue to meet with other grant participants
- Offering teachers who do not have their own classrooms the opportunity to select technology more appropriate to their situation (as opposed to SMART Boards)

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[4] Teachers could choose more than one answer to this question, so the percentages add up to more than 100.

3. EVALUATION OF INTERMEDIATE TERM OUTCOMES

3.1 GOAL #1: INCREASED TEACHER KNOWLEDGE AND ABILITY TO PROVIDE HIGH QUALITY INSTRUCTION FOR STUDENTS

One of the four intermediate goals of ESMC II was to improve participants' math content knowledge. In order to evaluate the extent to which the grant met this objective, Macro compared Cohort IV participants' scores on content quizzes from the MSDE algebra online modules to participants' scores from an instrument that Macro developed to measure post-ESMC content knowledge.

3.1.1 Methodology

Macro developed the post-ESMC instrument by adapting items from the content quizzes in the MSDE algebra online course to create an eight-question assessment instrument that covered seven different topic areas (Appendix 5). The questions that were included in the post-grant instrument were those that the fewest percentage of participants got correct during the online modules. This instrument was then administered online to ESMC participants in the fall of 2008.

Macro also used a retrospective skill assessment to gauge the extent to which teachers' skill and knowledge had changed over the course of ESMC II. Macro administered this assessment to Cohort III teachers as part of an online survey in April 2008; this survey is provided as Appendix 4.

3.1.2 Results

Figure 14 shows each of the eight topics covered in the content knowledge assessment and indicates how many people answered the question for that topic correctly in the pre-test (given during the online algebra modules) and the post-test (the April 2008 survey). The data show that overall scores on this assessment did not change; the average score on both the pre- and post-tests was 69 percent. Scores on the post-test improved for six of eight questions, while scores on the remaining two decreased.

Figure 14: Change in Cohort IV Participants' Content Knowledge (N=27)
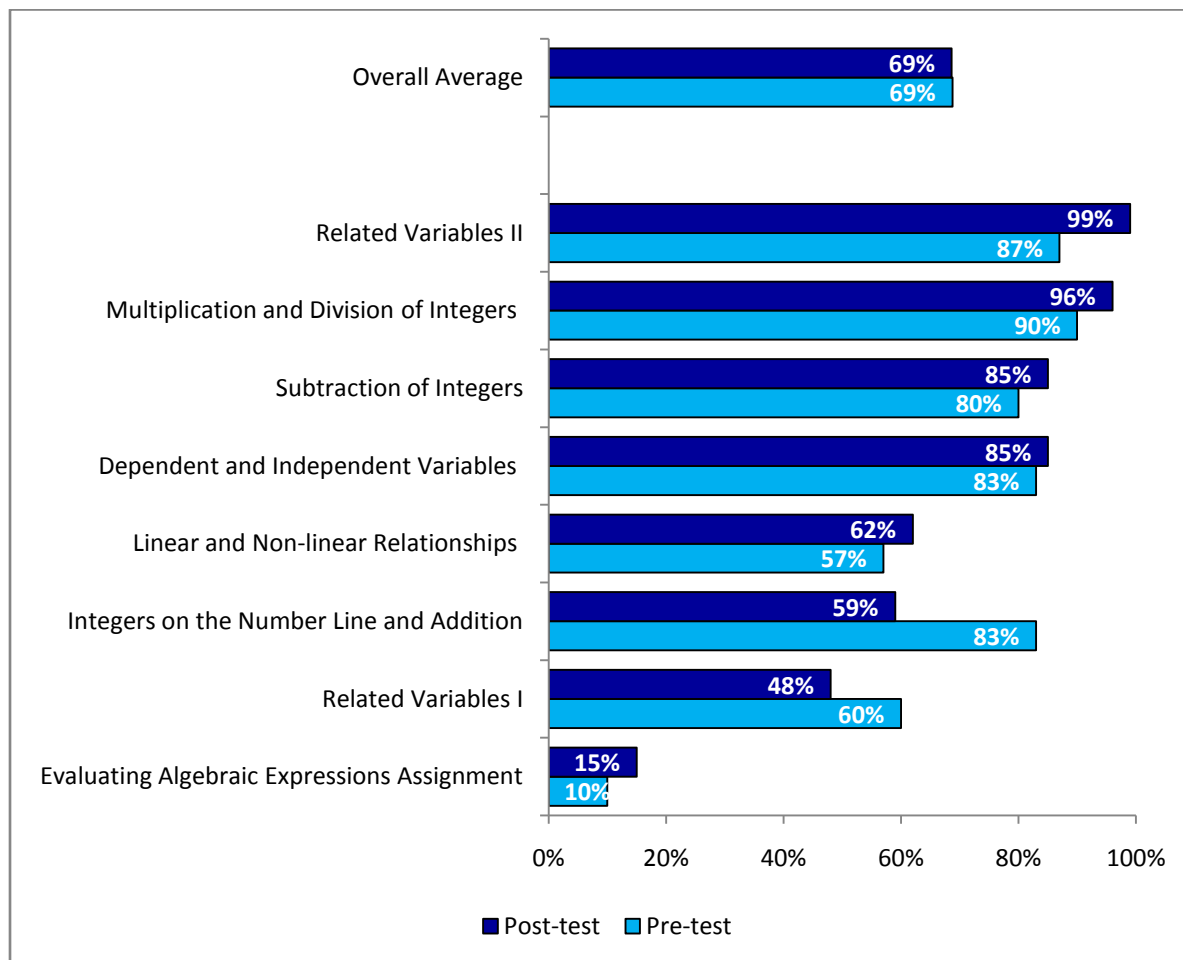
The data also showed that teachers felt that their skills in certain pedagogical areas had improved as a result of ESMC. Figure 15 shows how teachers rated their skill prior to joining ESMC in 2007 and how they rated their skill in April 2008. The skill that teachers feel they have improved the most is using instructional technology in the classroom—76 percent of teachers rate their current skill as "expert" or "high intermediate," compared with 40 percent at the beginning of the grant. The percentage who rated their current skill as "expert" or "high intermediate" in differentiating instruction and creating engaging learning activities for students increased by 32 percent from the beginning to the end of the grant.

Figure 15: Teachers' Skill Improvement over the Duration of ESMC II, Cohort III, (N=25)
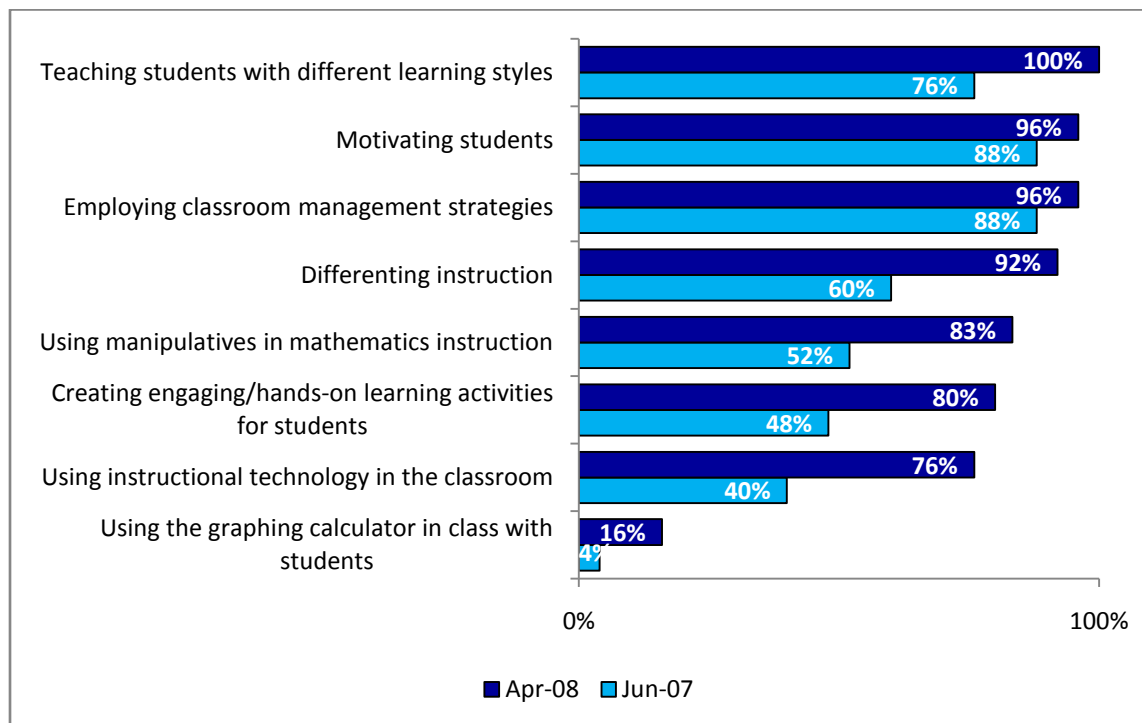
3.2 GOAL #2: INCREASED TEACHER SUCCESS ON THE MATH PRAXIS II EXAM

The second intermediate goal of the ESMC II grant was to increase the number of teachers who passed the middle school Math Praxis II exam.

3.2.1 Methodology

In order to evaluate the extent to which the grant met this objective, Macro compared the number of Cohort III and Cohort IV participants who had passed the Praxis at the beginning of the grant to the number who had passed at the end of the grant.

3.2.2 Results

When Cohort III began participating in the grant, six members indicated that they had passed the Praxis II Mathematics Examination. Macro surveyed Cohort III teachers again in April 2008 and found that nine members had passed the exam—three more than at the beginning of the grant. Meanwhile, six members of Cohort IV indicated that they passed Praxis as of June 2008. By the end of the ESMC II grant, an additional five Cohort IV teachers had passed. Therefore, over the course of the ESMC grant, at least eight additional teachers have passed Praxis. Some of the participants who had not yet passed the Praxis II are not required to because the state of Maryland accepts certain GRE, SAT, and ACT scores in place of the Praxis.

3.3 GOAL #3: INCREASED POSITIVE ATTITUDES TOWARDS MATH AMONG STUDENTS

Research shows a direct connection between how positively students feel towards mathematics and their future success in the subject. In order to assess whether students' attitude towards math had changed over the course of the year, Macro administered a questionnaire to students at the beginning and end of the 2007/2008 school year (Appendix 6). Macro developed this questionnaire based on the Fennema-Sherman Mathematics Attitude Scale, which was developed by Fennema and Sherman in 1976.[5] The version that Macro used as a basis of its instrument was a shortened version of the Fennema-Sherman Scale developed by Mulhern and Rae in 1998[6].

3.3.1   Methodology

Originally, the Fennema-Sherman was originally designed for high school students. However, since most of the teachers in Cohort III teach elementary school, Macro revised the instrument to make it grade-level appropriate. Ultimately, 23 questions were adapted from the Fennema-Sherman and reworded into simpler language and sentence structure. These questions were designed to measure eight factors:

- the extent to which students perceive math as being useful;
- the extent to which students perceive math as a "male dominated" field;
- the extent to which students perceive math as valued by their parents;
- the extent to which students perceive math as valued by their teachers;
- students' attitude toward success in math;
- students' confidence in math;
- students' enjoyment of math; and
- students' motivation to do well in math.

Upon the recommendation of Salisbury University professors involved in the ESMC project, Macro also added two additional questions to the instrument that are designed to measure student attitudes that are related to the successful implementation of an inquiry-based teaching approach in the classroom. Therefore, the final instrument had 25 items that addressed a total of nine different topics.

The survey consists of a series of statements, such as "I like math." Respondents were asked to indicate their level of agreement or disagreement with each using a five-point scale: "strongly agree," "agree," "neutral," "disagree," and "strongly disagree." To accommodate younger

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[5] Fennema, E. and Sherman, J. "Fennema-Sherman Mathematics Attitudes Scales: Instruments Designed to Measure Attitudes toward the Learning of Mathematics by Females and Males," *Journal for Research in Mathematics Education*, 7 (5), 324-326.

[6] Mulhern, F., & Rae, G. (1998). Development of Shortened Form of the Fennema-Sherman Mathematics Attitude Scales. *Educational and Psychological Measurement* , (58)2, 295-306.

students, a "thumbs up/thumbs down" icon was also used to help them understand that the scale is meant to measure degree of agreement.

Once Macro analysts received the responses, they coded them into a number (1 through 5). A response of '5' meant that a respondent "strongly agreed" with a positive statement, or "strongly disagreed" with a negative statement. A response of '1' meant the opposite. Therefore, higher numerical responses reflect more positive student attitudes towards math. From these numerical codes, an average response was then calculated for each item. An average response was then calculated for each of the nine topic scales by averaging the responses for items within that scale.

Twenty-one teachers (75%) in Cohort III[7] administered the survey to their students in the beginning and the end of the 2007/2008 school year. The remaining Cohort III teachers worked in positions where they did not have their own classes and therefore did not return their surveys.

3.3.2 Results

Figure 16 ranks each of the nine topics based on how strongly students agreed or disagreed with the statements related to that topic. The results indicate that there was not a significant change in student attitudes towards math between the beginning of the school year and the end of the school year. In five of the nine categories, student attitudes stayed the same between the fall and spring semester. In the remaining four categories, student attitudes changed by 0.1 points.[8]

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[7] Cohort IV teachers did not administer the attitude survey because the ESMC II grant ended soon after the teachers went through the Summer Program. Therefore, it was not possible to measure whether their students' attitude towards math had changed because of their participation in ESMC.

[8] It is important to note that scores on the different scales cannot be compared to each other. For example, the fact that the average score for parent attitudes in the spring of 2008 was 4.4 compared to 3.6 for inquiry-based teaching does not necessarily mean that students feel more positively toward the former. Because the statements for the nine topic areas were not normed against each other, the relative responses on these statements are not meaningful. The only meaningful comparison in Figure 16 is between students' responses at the beginning and end of the school year.

Figure 16: Changes in Student Attitude from 2007 to 2008 (N=1,285)
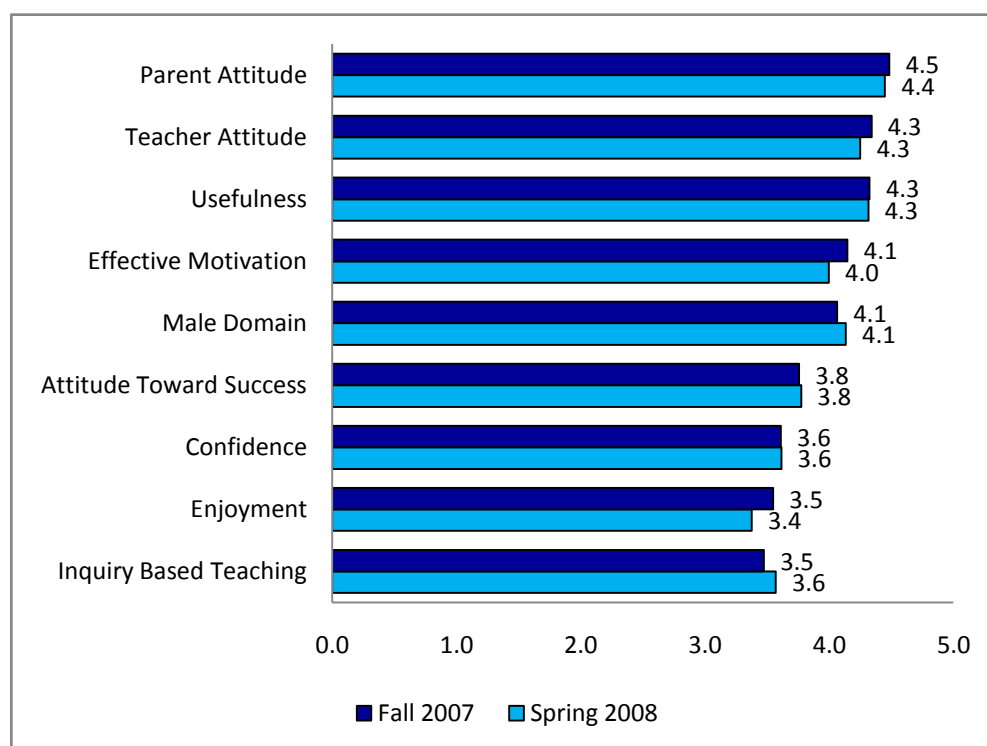
3.4 GOAL #4: INCREASED ACCESS TO AND USE OF TECHNOLOGY IN THE CLASSROOM

The fourth ESMC goal that Macro assessed is based on activity seven of the MSDE application, which states that through ESMC, "teachers will receive technology items including a graphing calculator, document camera, and LCD projector as well as the Navigation Series for Algebra to enhance their teaching skills. Instruction on their use will be included in the summer Program."

3.4.1 Methodology

To evaluate whether the grant achieved this goal, Macro surveyed the Cohort III participants when they first joined the grant in 2007 to gauge how accessible different technological resources and manipulatives were at their schools. Macro surveyed the Cohort III teachers again at the end of their participation in April 2008 to assess how accessible the tools had become, how valuable the teachers perceived them the tools to be, and how skilled the teachers had become at using the tools.

3.4.2 Findings

3.4.2.1 Access to Technology and Manipulatives

Upon joining ESMC in April 2007, over 70 percent of Cohort III teachers indicated that a classroom internet connection (93%), the school computer lab (79%), and the digital camera (72%) were "readily accessible" or "accessible with minimal effort" (Figure 17). The least

accessible resources were graphing calculators for students (27%), interactive whiteboards (21%), and calculator-based laboratory materials (10%).

Figure 17 shows that over the course of the grant, ESMC participants reported that most resources became more accessible. The data show increased access to tools that ESMC provided, such as the document cameras and LCD projectors. Notably, accessibility to non-ESMC sponsored tools also increased, such as the computer lab and laptops for students. These increases could reflect general increases in technology at these schools, which is also encouraging.

Interestingly, the percentage of respondents who said they have internet access in their rooms went down from 93 percent to 77 percent between the beginning of ESMC and the end of ESMC. One explanation for this finding could be that as teachers use the internet more with their students, their expectation for what constitutes "internet access" (e.g., number of computers, connection speed) increases.

Figure 17: Change in Access to Technology over the Course of ESMC, Cohort III (N=26)

Percent of Teachers Indicating these Tools are "Readily Accesible" or "Accessible with Minimal Effort"

Document camera: 100% (Apr-08), 48% (Jun-07)
LCD Projector: 96% (Apr-08), 69% (Jun-07)
School computer lab: 92% (Apr-08), 79% (Jun-07)
Internet connection for students during class: 77% (Apr-08), 93% (Jun-07)
Digital camera: 69% (Apr-08), 72% (Jun-07)
Laptops for students: 60% (Apr-08), 43% (Jun-07)
Interactive whiteboards/Smartboards: 38% (Apr-08), 21% (Jun-07)
Graphing calculators for students: 23% (Apr-08), 27% (Jun-07)
Calculator-Based Laboratory materials: 8% (Apr-08), 10% (Jun-07)

■ Apr-08   ■ Jun-07

3.4.2.2   Frequency of Use and Perceived Value of Technology and Manipulatives

In addition to technology access, Macro asked Cohort III participants both at the beginning and at end of their participation in the grant about how often they used various types of technology and manipulatives in their teaching. Figure 18 illustrates that teachers used most types of resources more frequently after participating in the ESMC grant. These results are unsurprising

in instances where teachers received the resource as part of their participation in the grant; for example, 100 percent of teachers reported that they used a document camera in April 2008, compared with only 31 percent in June 2007. However, Figure 18 also shows that ESMC participants used other types of technology more frequently as well, such as computer-based activities and the internet.

Figure 18: Use of Technology Resources in the Classroom, Cohort III, 2008 (N=26)

Percent of teachers indicating that they use tools two or more times per month

Tool	Apr-08	Jun-07
Document camera	100%	31%
Manipulatives	96%	100%
LCD Projector	92%	47%
Internet	85%	55%
Computer-based activities or resources	77%	61%
Dice	54%	62%
Laptops for students	54%	33%
Digital camera	31%	21%
Interactive whiteboards/Smartboards	31%	14%
Tangrams	23%	11%
Student graphing calculators	16%	13%
Algebra tiles	15%	18%
Hands on Equations manipulatives	12%	14%

■ Apr-08 □ Jun-07

Lastly, Macro asked teachers to indicate the value of each of the technological resources they received through ESMC. Figure 19 demonstrates that most teachers perceived all of the tools, except for the graphing calculator, to be "very valuable." In fact, more than 95 percent of teachers who received the document camera or LCD projector found them to be "very valuable." It is likely that some teachers found the graphing calculator less valuable because they taught younger grade levels where these calculators are not used.

Figure 19: Teachers' Perception about the Value of Technological Resources, Cohort III, (N=25)
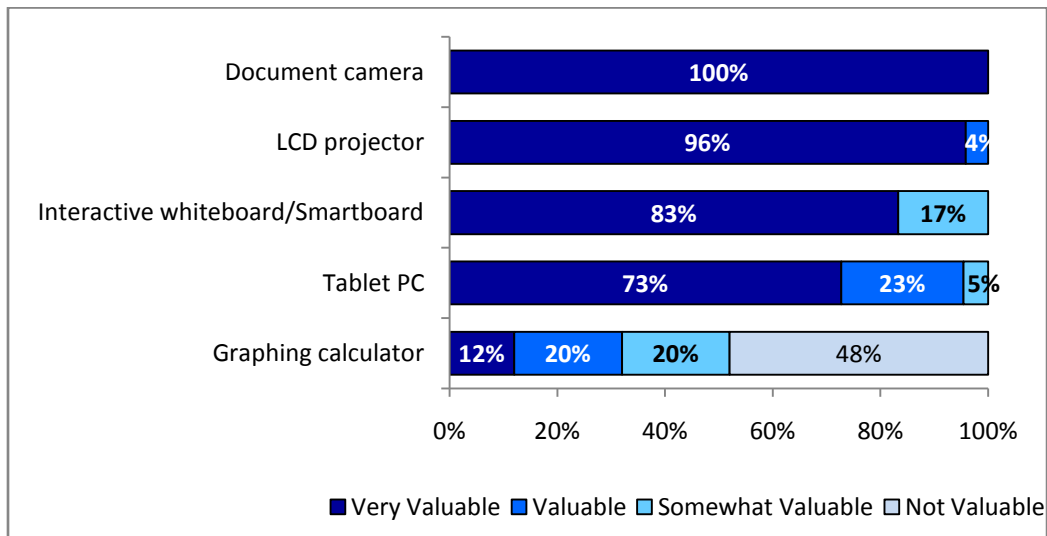
3.4.2.3   Skill

In addition to increasing access to tools, the ESMC grant also aimed to improve teachers' skill at using these tools. Figure 20 shows the percentage of participants who rated themselves as "expert" or "high intermediate" at the beginning and end of the grant. The data show that teachers' self-reported skill in using all of the tools improved over the duration of the grant. For example, 100 percent of teachers rated themselves as "expert" or "high intermediate" with using document cameras, LCD projectors and interactive whiteboards and Smartboards at the end of the grant, compared with one-third or less at the beginning.

Figure 20: Percentage of Participants Who Indicate they are "Expert" or "High Intermediate" in the Use of Various Technologies, Cohort III, April 2008 (N=25)
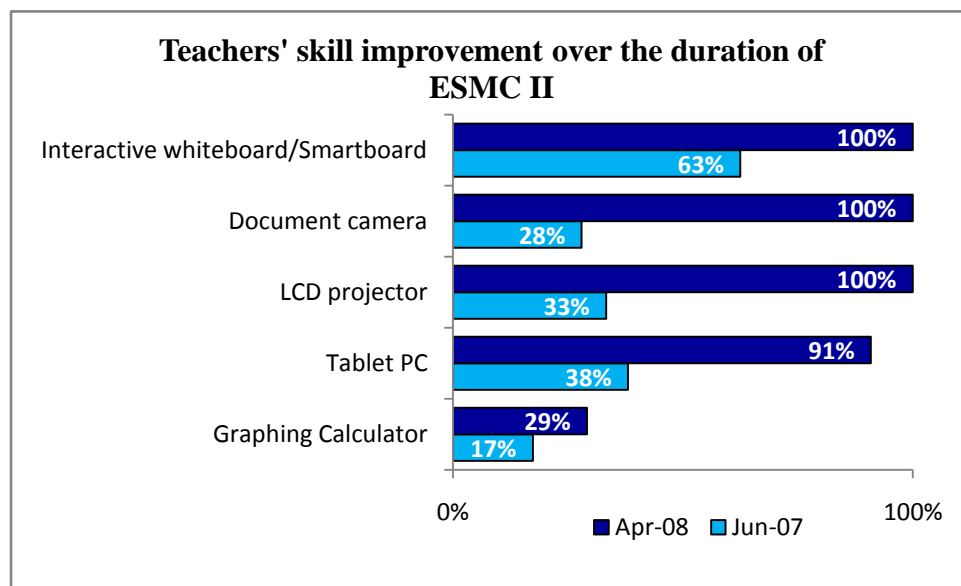
4. EVALUATION OF LONG TERM OUTCOMES

4.1 IMPROVED STUDENT ACHIEVEMENT ON THE MSA

As the logic model illustrates (Figure 2), the overall goal of the ESMC project is to improve student mathematics achievement. In its application for state funding, the ESMC set as a goal that:

> By June 30, 2008, 10% more 4th through 8th grade students in classes taught by Year 1 participating teachers will score proficient or advanced on the MSA in math as compared to the previous year.

4.1.1 Methodology

In order to measure whether this goal has been met, Macro requested that each participating LEA provide their students' mathematics MSA scores from 2007 and 2008. Five of the six participating LEAs provided data for this study[9]. Using the data, Macro first identified all students who had been taught by an ESMC teacher (i.e., a participant in Cohorts I, II, or III[10]) in 2007-08. We then compared the percentage of students who reached proficient status on the 2008 MSA (after they interacted with an ESMC teacher) to the percentage of students who reached proficient status on the 2007 and 2006 MSA (before they interacted with an ESMC teacher).[11] Macro also used a quasi-experimental design to compare the achievement of this pool of "treatment" students (those who were taught by ESMC teachers in 2007-08) to the achievement of "comparison" students who were taught by non-ESMC teachers. This comparison of "ESMC" and "non-ESMC" students provides a more rigorous measure of the extent to which teachers' participation in the grant has had an impact on their students' mathematics learning.

4.1.2 Findings

The data in Figure 21 show that among ESMC students, achievement did not increase between 2007 and 2008—in fact, the percentage of students that were proficient decreased by 2 percent. However, **this change was actually better than among non-ESMC students**, whose proficiency levels decreased by 5 percent over this same period. Therefore, while the ESMC grant did not reach its goal of a 10 percent increase in student proficiency on the MSA, there is some evidence that the grant had a positive impact on student achievement.

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[9] Kent County was not able to provide data from 2007, so its teachers were not included in our analysis.

[10] Although Cohorts I and II technically fall under a previous ESMC grant, the activities of the two grants are similar enough that Macro believed it would be valuable to pool results across all three groups of teachers.

[11] MSA scores fall within 3-tier proficiency scale: 1= Basic, 2= Proficient and 3= Advanced. For the purpose of this analysis, any student who achieved a "2" or "3" rating is considered "proficient."

Figure 21: Proficiency Status of ESMC versus Non-ESMC Students (N=5,217 Non-ESMC Students & 2,265 ESMC Students)

Percent of students who reached proficiency status on the MSA

ESMC: 2007 = 68%, 2008 = 66%
Non-ESMC: 2007 = 78%, 2008 = 73%

Legend: 2007, 2008
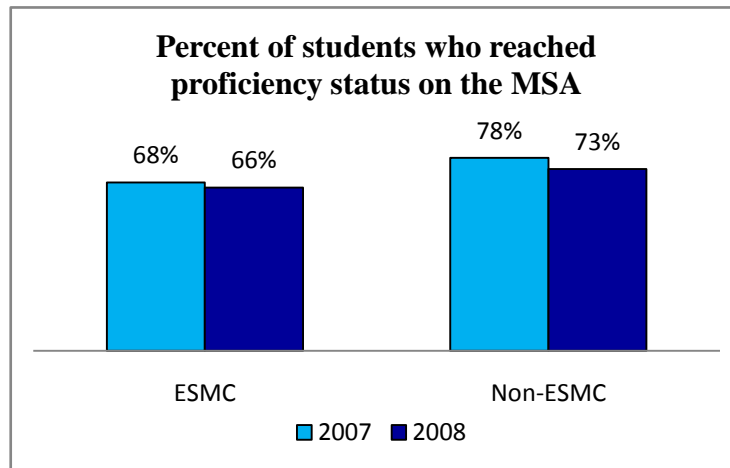
It is important to note that we do not believe that it is possible to draw any definitive conclusions about the impact of the grant based on this analysis alone. Cohorts II and III were in their first year of implementing what they had learned through the ESMC grant, and research has shown that student achievement effects often only appear in the longer term. Therefore, Macro will continue to track ESMC teachers to see if stronger impacts on student performance become apparent over time.

5. SUMMARY

This report describes the activities of Year 2 of the second ESMC grant, and evaluates its progress towards meeting its goals and objectives. The following are some key findings:

5.1 EVALUATION OF PROFESSIONAL DEVELOPMENT ACTIVITIES

5.1.1 ONLINE ALGEBRA MODULES

- Sixty-six percent of participants found the overall modules to be "very valuable" or "valuable," which was a decrease from 76 percent of participants in 2007. However, more Cohort IV teachers said that modules were aligned with teachers' skill level, were helpful in generating classroom ideas amongst teachers and caused fewer technical difficulties.

- In the prior year, the percentage of Cohort III participants who cited technology-related problems as the most popular reason for not accessing the modules was more than double the percentage of Cohort IV participants. The lack of technology-related comments this year may indicate that the technology aspect has improved from Cohort III to Cohort IV.

- Cohort IV teachers noted that the modules served as a good refresher/review of algebra content, allowed self-pacing, and provided them with ideas to use in the classroom

5.1.2 ONLINE DISCUSSION BOARD

- Sixty-eight percent of participants found the overall modules to be "very valuable" or "valuable," which was a decrease from 88 percent of participants in 2007. In addition, only 48 percent of Cohort IV participants "strongly agreed" or "agreed" that they were playing an important role in the discussion, compared with 79 percent in the previous year.

- Although the majority of respondents found the assigned readings to be both interesting and relevant, more people found the articles to be relevant rather than interesting: 84 percent of respondents "strongly agreed" or "agreed" that the readings were relevant to them while only 64 percent "strongly agreed" or "agreed" that the readings were interesting.

- Cohort IV teachers noted that they liked to hear other teachers' thoughts and receive ideas and strategies for their own classes.

5.1.3 SUMMER PROGRAM

- Forty-six percent of participants in this year's Program rated it as "good," while 35 percent found it to be "excellent." The remaining 19 percent found it to be fair.

- Some participants were not completely satisfied with the pace of this year's Program. About half of participants expressed that the discussions were too in-depth and that some of the activities took too long.

- Only thirty-two percent of participants indicated that they "strongly agreed" that the topics were relevant to them. Many participants thought that the content was not always grade-appropriate, and about 77 percent of participants would have liked to break more into groups based on grade level.

- The majority of teachers (89%) indicated that they "learned a lot" or "learned some" about every content topic on the agenda. The topic on which the participants learned the most was "division and multiplication of fractions" and "probability." The two strategies that participants learned the most were how to use manipulatives in mathematics instruction and how to engage students through hands on activities.

5.1.4 ADDITIONAL SUPPORT AND FOLLOW UP ACTIVITIES

- Aside from regular ESMC training and support, ESMC participants reported receiving various other types of support. For example, about three quarters of participants (76%) indicated that they communicated with other project participants outside of the ESMC sponsored workshops. In addition, the majority of participants (68%) indicated that they received further training on the technological resources provided to them through the ESMC grant. More than half of participants (56%) also indicated that they received feedback from people who had observed their lessons.

5.2 EVALUATION INTERMEDIATE TERM OUTCOMES

5.2.1 GOAL #1: INCREASED TEACHER KNOWLEDGE AND ABILITY TO PROVIDE HIGH QUALITY INSTRUCTION FOR STUDENTS

- Macro administered a pre- and post-test assessment to assess changes in teacher content knowledge over the course of the grant. The average scores did not change from the pre- to post-test; in both cases the average score was 69 percent. However, the average score did increase in 6 of the 8 content areas assessed.

- Teachers feel that their skills in certain pedagogical areas had improved because of ESMC. Over the course of the grant, the percentage of participants who said they have an "expert" or "high intermediate" level of skill when it comes to differentiating instruction, creating engaging learning activities for students, and using instructional technology in the classroom increased by at least 30 percent.

5.2.2 GOAL #2: INCREASED TEACHER SUCCESS ON THE MATH PRAXIS II EXAM

- At the beginning of ESMC II, six Cohort III members had passed the Praxis II Mathematics Examination. Macro surveyed Cohort III teachers again in April 2008 and found that nine members had passed the exam—three more than at the beginning of the grant. Meanwhile, six members of Cohort IV indicated that they passed Praxis as of June 2008. By the end of the ESMC II grant, an additional five Cohort IV teachers had passed. Therefore, over the course of the ESMC grant at least eight additional teachers have passed the Praxis exam.

5.2.3 GOAL #3: INCREASED POSITIVE ATTITUDES TOWARDS MATH AMONG STUDENTS

- The results of Macro's survey of student attitudes towards math indicate that there was not a significant change in attitudes between the beginning and end of the school year. In all nine of the topic areas studied, the change was no greater than 0.1 points on a 4-point scale.

5.2.4 GOAL #4: INCREASED ACCESS TO AND USE OF TECHNOLOGY IN THE CLASSROOM

- Teachers' accessibility to various technological tools and manipulatives increased after ESMC; for example, access to document cameras and LCD projectors improved by 52 percent and 27 percent, respectively. In April of 2008 more than 90 percent of teachers reported having easy access to document cameras, LCD projectors, and school computer labs.

- The majority of teachers found these new tools to be valuable and have become skilled at using them: more than 95 percent of teachers who received the document camera or LCD projector found them to be "very valuable."

- The professional development that the ESMC has provided appears to have been effective; all teachers indicate that they are "Expert" or "High Intermediate" in using these technologies.

- Teachers used technological tools and other hands-on resources more frequently after they participated in ESMC. In 2008, 100 percent of teachers reported that they used a document camera two or more times per month, with the majority of teachers (85%) using them every day. When they first joined ESMC, 31 percent of teachers reported using document cameras two or more times each month.

5.3 EVALUATION OF LONG TERM OUTCOMES

5.3.1 IMPROVED STUDENT ACHIEVEMENT ON THE MSA

- The percentage of ESMC students who were proficient on the MSA decreased by 2 percent from 2007 to 2008, meaning that the grant did not reach its goal of a 10 percent improvement in student proficiency. However, the percentage of non-ESMC students decreased by 5 percent from 2007 to 2008, meaning that in comparison ESMC teachers had a more positive change on their students' achievement than non-ESMC teachers. These findings provide some evidence—although not conclusive—that the professional development provided by the ESMC grant did have a positive impact on student achievement.

Appendix 1:

Progress Report on ESMC II Grant Activities

PLANNED ACTIVITIES	EVALUATOR COMMENTS	STATUS
Activity 1: Each year, each LEA will identify, recruit and select their allotted number of 4th-8th grade classroom, special education and ELL math teachers to participate in this project.	Together, the LEAs identified, recruited and selected 28 4th-8th grade teachers for Cohort III and 31 3rd-8th grade teachers for Cohort IV.	**COMPLETE**
Activity 2: The ESMC partnership will plan and deliver a five-day summer Program in algebra, math function topics, and Praxis II math content for participating teachers, taught by faculty from Salisbury University's (SU) Departments of Mathematics and Education.	ESMC partnership planned and delivered a five day Summer Program. Cohort III participated in the Program in 2007, while Cohort IV participated in 2008. The topics of this Program in both years included algebra, math function topics, and Praxis II math content. For a more detailed discussion of this Program, as well as participants' feedback, see Section 2.3 of this report.	**COMPLETE**
Activity 3: Participating teachers will work on the MSDE online algebra modules for 12 hours prior to the summer Program, facilitated by 2 math Professional Development coaches.	Participants in Cohorts III and IV participated in the algebra online modules during a three-month period when they first joined the grant. For a more detailed discussion of these modules, as well as participants' feedback, see Section 2.1 of this report.	**COMPLETE**
Activity 4: An online discussion board will be facilitated by SU education faculty for all participating teachers, to take place over 8 weeks, 3 prior to and 5 following the summer Program. Each teacher will spend 24 hours on the discussion board.	Salisbury University professors facilitated an online discussion board for all participating teachers and coaches in both Cohorts in the summer of their year of grant participation. For a more detailed discussion of this discussion board, as well as participants' feedback, see Section 2.2 of this report.	**COMPLETE**
Activity 5: An estimated 15 teachers per year who are not highly qualified in the grades they teach will attend a half-day Saturday Praxis math preparation workshop conducted by an SU math faculty member.	The Consortium did offer a Praxis workshop, which 8 Cohort III teachers and 6 Cohort IV attended.	**COMPLETE**

PLANNED ACTIVITIES	EVALUATOR COMMENTS	STATUS
Activity 6: Teachers will be provided with memberships in the National and Maryland Councils of Teachers of Mathematics (NCTM and MCTM).	All participating teachers received memberships to the National and Maryland Councils of Teachers of Mathematics (NCTM and MCTM).	**COMPLETE**
Activity 7: Teachers will receive technology items including a graphing calculator, document camera, and LCD projector as well as the Navigation Series for Algebra to enhance their teaching skills. Instruction on their use will be included in the summer Program.	Cohort III and Cohort IV teachers received either a laptop, a whiteboard or a Smartboard, an LCD projector, a replacement LCD bulb, a document camera, as well as a graphing calculator. Salisbury University provided training on these tools during the Summer Program both years.	**COMPLETE**
Activity 8: Teachers will attend an orientation meeting before the Program and a capstone meeting after. Each LEA will hold an in-county mid-year follow up meeting.	The ESMC grant held an orientation meeting for each cohort in the early spring before their Summer Program. The grant also held a capstone meeting for each cohort in the early fall following their Summer Program. All meetings were co-facilitated by ESMC staff and SU professors. A survey conducted by Macro found that 40 percent of Cohort III participants said that they had participated in a follow-up meeting with other participants within their district. Therefore, it appears that while some LEAs held follow-up meetings, in other districts these meetings may not have taken place.	**PARTIALLY COMPLETE**
Activity 9: Teachers will develop an online portfolio with mathematics lessons aligned with the Voluntary State Curriculum for access by all Maryland teachers	Teachers developed a portfolio of lessons based on their counties' guidelines. ESMC II grant personnel reviewed these lessons and sent them to Salisbury University to post on their website.	**COMPLETE**

PLANNED ACTIVITIES	EVALUATOR COMMENTS	STATUS
Activity 10: Math Coordinators/Supervisors from ESMC LEAs will conduct observations and meetings with teachers in the classroom and after school for ongoing, job-embedded follow-up to the summer Programs.	These follow-up activities were administered at the individual LEA level, rather than by the Consortium itself. A survey conducted by Macro found that 56 percent of Cohort III members reported having received feedback based on observations of their classrooms.	**PARTIALLY COMPLETE**
Activity 11: Teachers will give formative assessments to determine the progress of their students in math.	Because LEAs have their own formative assessment programs, the implementation of Activity 11 was addressed at the LEA level. ESMC participants made use of their local assessment programs to collect data to inform their own teaching.	**COMPLETE**

Appendix 2:
Pre-Workshop Participant Survey,
Cohort IV, June 2008

Please complete this questionnaire and turn it in before today's session begins. *The information you provide is confidential and will be analyzed by an independent evaluator; your responses will not be seen by anyone from your district.* Thank you for your assistance.

Name: _____ School District: _____

Section I: Online Algebra Modules

1. **In preparation for this workshop, participants were asked to participate in online algebra modules developed by the Maryland State Department of Education. How valuable did you find each of the following aspects of the modules?**

	Very valuable	Valuable	Somewhat valuable	Not at all valuable
a) Overall value of modules as a whole	❑	❑	❑	❑
b) Threaded discussions with other participants	❑	❑	❑	❑
c) Course assignments	❑	❑	❑	❑
d) Feedback from facilitator	❑	❑	❑	❑

2. **To what extent do you agree or disagree with the following statements about the online modules?**

	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree
a) The modules provided me with ideas that I will be able to use in my own classroom.	❑	❑	❑	❑	❑
b) The modules improved my understanding of algebra content.	❑	❑	❑	❑	❑
c) Technical issues interfered with my use of the modules.	❑	❑	❑	❑	❑
d) The course content was logically organized and sequenced.	❑	❑	❑	❑	❑
e) The course work matched my level of knowledge and skills.	❑	❑	❑	❑	❑
f) The topics addressed were relevant to my interests and/or professional responsibilities.	❑	❑	❑	❑	❑
g) The facilitator demonstrated background knowledge and mastery of the course content.	❑	❑	❑	❑	❑
h) The facilitator was responsive to questions and issues raised by me and others in the course.	❑	❑	❑	❑	❑

3. **What did you like most about the modules?**

_____

_____

_____

4. **Do you have any suggestions for how the MSDE online modules could be improved?**

_____

_____

_____

Section II: Online Discussion Board

5. In the weeks leading up to this Summer Institute, you have been participating in an online discussion board supported by Salisbury University. How valuable have you found each of the following aspects of the discussion, in terms of the extent to which it will make your classroom teaching more effective?

	Very valuable	Valuable	Somewhat valuable	Not at all valuable
a) Course assignments	❑	❑	❑	❑
b) Postings from other participants	❑	❑	❑	❑
c) Postings from facilitator	❑	❑	❑	❑
d) Overall value of online discussion	❑	❑	❑	❑

6. Approximately how many hours PER WEEK have you spent completing assigned readings and participating in the online discussion? _____ Hours *(Note: Your answer will be used for* _evaluation purposes only_*; this information will not be provided to the grant facilitator or used to determine your stipend.)*

7. On average, how frequently do you log on to the discussion board?
   ❑ Every day
   ❑ A few times a week
   ❑ Once a week
   ❑ Less than once a week [*Please answer #7b*]
   ❑ Never [*Please answer #7b*]

   7b. [*If answered "less than once a week" or "never" to #7*] Why aren't you participating in the discussion more frequently? Is there anything that can be done to make you participate more?

   _____

   _____

   _____

8. **What have you liked __most__ about participating in the online discussion?**

_____

_____

_____

9. To what extent do you agree or disagree with the following statements about this discussion board?

	Strongly Agree	Agree	Slightly Agree	Slightly Disagree	Disagree	Strongly Disagree
a) The readings that have been assigned are relevant to me.	❑	❑	❑	❑	❑	❑
b) I have found the readings to be interesting.	❑	❑	❑	❑	❑	❑
c) The facilitator is encouraging and supportive.	❑	❑	❑	❑	❑	❑
d) Technical problems have interfered with my participation in the discussion.	❑	❑	❑	❑	❑	❑
e) I feel comfortable posting comments to the discussion board.	❑	❑	❑	❑	❑	❑
f) I feel comfortable responding to other people's comments.	❑	❑	❑	❑	❑	❑
g) I feel that I am playing an important role in the discussion.	❑	❑	❑	❑	❑	❑

10. Do you have any suggestions for how this online discussion could be improved?

_____

_____

_____

Section III: Praxis Exam

11. Have you successfully passed the Mathematics Praxis II Examination?

❑ Yes **(SKIP to Q.13)**
❑ No

12. Do you need to take the Mathematics Praxis II Exam to attain "highly qualified" status?

❑ Yes
❑ No
❑ I don't know

13. Do you currently have "highly qualified" status in the state of Maryland?

❑ Yes
❑ No
❑ I don't know

THANK YOU FOR COMPLETING THIS QUESTIONNAIRE.

Appendix 3:
Post-Workshop Participant Survey,
Cohort IV, June 2008

Eastern Shore Math Consortium
Post-Workshop Participant Survey

Please complete this questionnaire and turn it in before today's session begins. ***The information you provide is confidential and will be analyzed by an independent evaluator; your responses will not be seen by anyone from your district.*** Thank you for your assistance.

1. **Name:** _____

2. **The pace of this workshop was:**

   ❐ Just right　　　　❐ Too fast　　　　❐ Too slow

3. **The length of this workshop was:**

   ❐ Just right　　　　❐ Too short　　　　❐ Too long

4. **The instructors employed approaches and methods that were compatible with my learning style and preferences.**

   ❐ Strongly agree　　❐ Agree　　　　❐ Disagree　　　❐ Strongly disagree

5. **The topics addressed at this workshop were relevant to the math content that I teach.**

   ❐ Strongly agree　　❐ Agree　　　　❐ Disagree　　　❐ Strongly disagree

6. **Overall, the quality of this workshop was:**

   ❐ Excellent　　　❐ Good　　　❐ Fair　　　❐ Poor

7. **In this workshop, how much did you learn about how to teach the following topics to your students?**

	Learned a lot	Learned some	Did not learn anything	This topic was not covered in workshop
a) Ratios	❑	❑	❑	❑
b) Division/multiplication of fractions	❑	❑	❑	❑
c) Part/whole	❑	❑	❑	❑
d) Linear vs. non-linear relationships	❑	❑	❑	❑
e) Word problems	❑	❑	❑	❑
f) Interpreting graphs	❑	❑	❑	❑
g) Number operations	❑	❑	❑	❑
h) Probability	❑	❑	❑	❑
i) Rational numbers	❑	❑	❑	❑

8. **How much do you feel you learned about the following topics during this workshop?**

	Learned a lot	Learned some	Did not learn anything	This topic was not covered in workshop
a) Engaging/ hands-on learning activities for students	❏	❏	❏	❏
b) Strategies for using instructional technology in the classroom	❏	❏	❏	❏
c) Strategies for using manipulatives in mathematics instruction	❏	❏	❏	❏
d) Review of algebra curriculum/content	❏	❏	❏	❏
e) Strategies for differentiating instruction	❏	❏	❏	❏
f) Classroom management strategies	❏	❏	❏	❏
g) Strategies for teaching students with different learning styles	❏	❏	❏	❏
h) Basics of how to use graphing calculators	❏	❏	❏	❏
i) Strategies for using the graphing calculator in class with students	❏	❏	❏	❏
j) Strategies for motivating students	❏	❏	❏	❏

9. **Which portions of this workshop did you like most?**

_____

_____

_____

_____

_____

10. **What suggestions do you have for how this workshop could have been improved?**

_____

_____

_____

_____

_____

11. **As part of your participation in this project, you will be receiving a number of technological resources. How valuable do you anticipate each of the following will be for you during the upcoming school year?**

	Very valuable	Valuable	Somewhat valuable	Not valuable
a) LCD projector	❏	❏	❏	❏
b) Document camera	❏	❏	❏	❏
c) Tablet	❏	❏	❏	❏
d) Interactive whiteboard/ Smartboard	❏	❏	❏	❏
e) Graphing calculator	❏	❏	❏	❏

12. **How prepared do you feel to use each of these resources in the upcoming school year?**

	Very well-prepared	Somewhat well-prepared	Not well-prepared
a) LCD projector	❏	❏	❏
b) Document camera	❏	❏	❏
c) Tablet	❏	❏	❏
d) Interactive whiteboard/ Smartboard	❏	❏	❏
e) Graphing calculator	❏	❏	❏

THANK YOU FOR COMPLETING THIS QUESTIONNAIRE.

Appendix 4:

Mid-Year Survey, Cohort III, April 2008

Mid-Year Survey, Cohort III, April 2008

Thank you for participating in this survey. Your responses will be used by the administrators of the Eastern Shore Math Consortium to help improve the program for you and for future participants.

This survey will take approximately 10 minutes to complete. If you have any questions or concerns, please contact Ilana Horwitz at ilana.m.horwitz@macrointernational.com or (301) 572-0835.

Please click "Start Survey" to begin the survey.

1. What is your name? _____

2. In what school do you teach? _____

3. What grade(s) do you currently teach? (CHECK ALL THAT APPLY)
- ☐ **K**
- ☐ **1**
- ☐ **2**
- ☐ **3**
- ☐ **4**
- ☐ **5**
- ☐ **6**
- ☐ **7**
- ☐ **8**
- ☐ **9**
- ☐ **10**
- ☐ **11**
- ☐ **12**

5. Have you successfully passed the Mathematics Praxis II Examination?
- ☐ Yes

- ☐ No

IF Q5 = YES THEN SKIP TO Q7

6. Do you need to take the Mathematics Praxis II Exam to attain "highly qualified" status?
- ☐ Yes

- ☐ No

- ☐ I don't know

7. Do you currently have "highly qualified" status in the state of Maryland?
- ☐ Yes

- ☐ No

- ☐ I don't know

8. How accessible are the following resources to you this year?

	Readily accessible	Accessible with minimal effort	Accessible with substantial effort	Not accessible
a) Laptops for students	☐	☐	☐	☐
b) Graphing calculators for students	☐	☐	☐	☐
c) Calculator-Based Laboratory materials (e.g., probes, sensors)	☐	☐	☐	☐
d) School computer lab	☐	☐	☐	☐
e) Internet connection for students during class	☐	☐	☐	☐
f) LCD Projector	☐	☐	☐	☐
g) Document camera	☐	☐	☐	☐
h) Interactive whiteboards/Smartboards	☐	☐	☐	☐

9. During this school year, how often have you used the following in your classes with students:

	Every day	2-5 times per week	2-4 times per month	2-4 times per semester	1-2 times this year	Not at all
a) Manipulative (in general)	☐	☐	☐	☐	☐	☐
b) Dice	☐	☐	☐	☐	☐	☐
c) Algebra tiles	☐	☐	☐	☐	☐	☐
d) Tangrams	☐	☐	☐	☐	☐	☐
e) *Hands on Equations* manipulatives	☐	☐	☐	☐	☐	☐
f) Laptops for students	☐	☐	☐	☐	☐	☐
g) Computer-based activities or resources	☐	☐	☐	☐	☐	☐
h) Internet	☐	☐	☐	☐	☐	☐
i) LCD Projector	☐	☐	☐	☐	☐	☐
j) Document camera	☐	☐	☐	☐	☐	☐
k) Tablet	☐	☐	☐	☐	☐	☐
l) Interactive whiteboards/Smartboards	☐	☐	☐	☐	☐	☐

10. How would you rate your skill in the following areas CURRENTLY?

	Expert	High Intermediate	Low Intermediate	Novice
a) Creating engaging/ hands-on learning activities for students	☐	☐	☐	☐
b) Using instructional technology in the classroom	☐	☐	☐	☐
c) Using manipulatives in mathematics instruction	☐	☐	☐	☐
d) Differentiating instruction	☐	☐	☐	☐
e) Employing classroom management strategies	☐	☐	☐	☐
f) Teaching students with different learning styles	☐	☐	☐	☐
g) Using the graphing calculator in class with students	☐	☐	☐	☐
h) Motivating students	☐	☐	☐	☐

11. How would you rate your skill in the following areas BEFORE YOU ATTENDED LAST SUMMER'S WORKSHOP?

	Expert	High Intermediate	Low Intermediate	Novice
a) Creating engaging/ hands-on learning activities for students	☐	☐	☐	☐
b) Using instructional technology in the classroom	☐	☐	☐	☐
c) Using manipulatives in mathematics instruction	☐	☐	☐	☐
d) Differentiating instruction	☐	☐	☐	☐
e) Employing classroom management strategies	☐	☐	☐	☐
f) Teaching students with different learning styles	☐	☐	☐	☐
g) Using the graphing calculator in class with students	☐	☐	☐	☐
h) Motivating students	☐	☐	☐	☐

12. As part of your participation in this program, you have received a number of technological resources. How valuable have you found each of the following resources?

	Very valuable	Valuable	Somewhat valuable	Not valuable	I did not receive this resource
a) LCD projector	☐	☐	☐	☐	☐
b) Document camera	☐	☐	☐	☐	☐
c) Tablet	☐	☐	☐	☐	☐
d) Interactive whiteboard/ Smartboard	☐	☐	☐	☐	☐
e) Graphing Calculator	☐	☐	☐	☐	☐

13. How would you rate your CURRENT skill at using each of the resources that you received?

	Expert	High Intermediate	Low Intermediate	Novice	I did not receive this resource
a) LCD projector	☐	☐	☐	☐	☐
b) Document camera	☐	☐	☐	☐	☐
c) Tablet	☐	☐	☐	☐	☐
d) Interactive whiteboard/Smartboard	☐	☐	☐	☐	☐
e) Graphing Calculator	☐	☐	☐	☐	☐

14. How would you rate your skill at using each of these resources BEFORE LAST SUMMER'S WORKSHOP?

	Expert	High Intermediate	Low Intermediate	Novice	I did not receive this resource
a) LCD projector	☐	☐	☐	☐	☐
b) Document camera	☐	☐	☐	☐	☐
c) Tablet	☐	☐	☐	☐	☐
d) Interactive whiteboard/Smartboard	☐	☐	☐	☐	☐
e) Graphing Calculator	☐	☐	☐	☐	☐

15. What types of support have you received this school year to help you implement what you learned last summer? (CHECK ALL THAT APPLY)

☐ Feedback based on observations of your lessons
☐ Follow-up meetings with other project participants within your district
☐ Follow-up meetings with other project participants in other districts
☐ Communication with other project participants through other means (e.g., e-mail or online discussion)
☐ Further professional development on using the technological resources you received
☐ Other: _____

16. What types of support would make it easier for you to apply what you learned last summer?

_____

_____

_____

Thank you very much for completing this survey, and for providing information that will help us improve both this project and similar projects in the years to come. Again, if you have any questions or comments about this survey please contact Ilana Horwitz at ilana.m.horwitz@macrointernational.com or 301-572-0835

Appendix 5:

Eastern Shore Math Consortium Content Assessment, Cohort IV, September 2008

Eastern Shore Math Consortium Content Assessment, Cohort IV

Thank you very much for completing this worksheet as part of the evaluation of the Eastern Shore Math Consortium. Completion of this survey is required by MSDE as part of the grant funding. **Data will never be reported for individual respondents**; the only number that will be reported as part of the evaluation is what percentage of the cohort answered each question correctly. However, you must put your name on this survey so that we can verify that you have completed it.

Name: _____

Evaluating Algebraic Expressions

The triangle pattern below will be used to tile a patio. **The height of the triangle and its base are the same length.** Remember the area of a triangle is given by the formula:

Area (triangle) = $\frac{1}{2}$(base)(height)
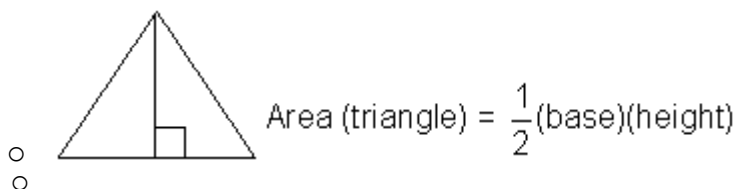
1. How many 1 inch height triangular tiles will it take to cover a 6 foot by 8 foot patio?

   _____

Dependent and Independent Variables

2. In the following variable relationship, which variable is the dependent variable and which is the independent variable?

   C = 1.69g, where C is the cost of gasoline and g is the number of gallons of gasoline.

C	☐ Dependent	☐ Independent
g	☐ Dependent	☐ Independent

Subtraction of Integers

3. We stayed at a hotel while on vacation in the Netherlands that was 15 feet below sea level. The next day our tour took us to a hotel that was 10 feet above sea level. What was our change in altitude (distance above/below sea level)?

Linear and Non-linear Relationships

4. The table below shows the total number of flowers after a number of days.

Number of Days	Number of Flowers
1	2
2	4
3	8
4	16
5	32
6	64

As the number of days increases by one, how does the number of flowers increase?

_____

Is the rate of change constant?

_____

Is the pattern linear or nonlinear?

_____

Describe the pattern.

_____

Integers on the Number Line and Addition

5. The stock sold for $30 at the beginning of the trading day. The price went up $1.20 during the morning, then fell $2.50 in the afternoon. Write an equation using integers to represent each of the following situations. Determine the answer to your equation:

_____

Multiplication and Division of Integers

6. A scuba diver is descending in the water at 5 feet per second. Write an equation that shows how far below the water's level he will be after 16 seconds.

_____

Related Variables

7. The following table shows the average recommended weights for heights of women aged 25 - 30 years old. Find the pattern and fill in the missing values.

Height (inches)	Weight (pounds)
58	115
60	119
62	123
64	
66	
68	
70	

8. Name the variables(s) and the constant(s) in the following situation:

   The money you spend on your computer internet if they charge a one-time fee of $30 plus $21 a month.

   What is/are the variable(s)?

   What is/are the constant(s)?

Appendix 6:
Student Mathematics Attitude Survey, Cohort III, September and April 2008

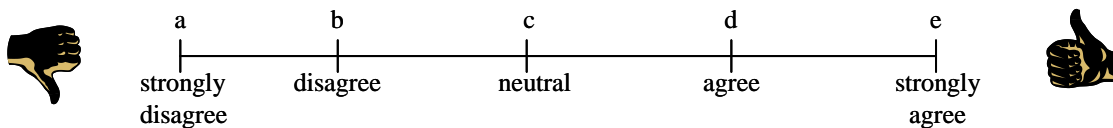# Student Mathematics Attitude Survey, Cohort III

Please record your answers on the separate answer sheet your teacher will give you—do <u>not</u> write on this page. Your answers are very important, because we will use them to learn how students like you think about mathematics. **Please be honest—no one in your school will see what you write, including your teacher or your friends.**
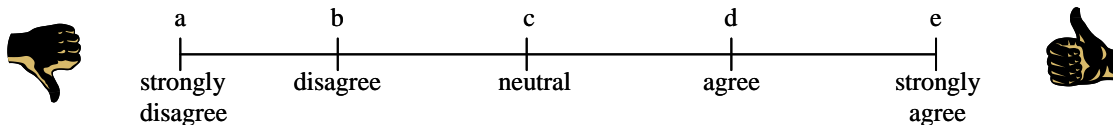
Thank you for your help!
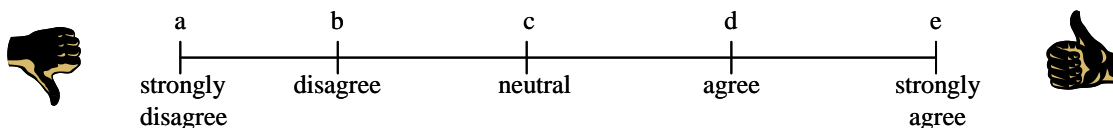
1. I think it is fun to do math problems.

a	b	c	d	e
strongly disagree	disagree	neutral	agree	strongly agree
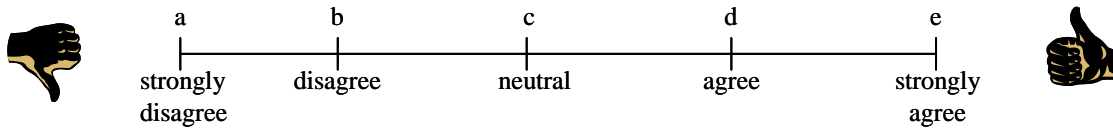
2. If I got the highest grade in math I would tell my friends.

a	b	c	d	e
strongly disagree	disagree	neutral	agree	strongly agree

3. I will use math in many ways as an adult.

a	b	c	d	e
strongly disagree	disagree	neutral	agree	strongly agree

4. I'm good at math.

a	b	c	d	e
strongly disagree	disagree	neutral	agree	strongly agree

5. I usually feel confident when I try math problems.

a	b	c	d	e
strongly disagree	disagree	neutral	agree	strongly agree
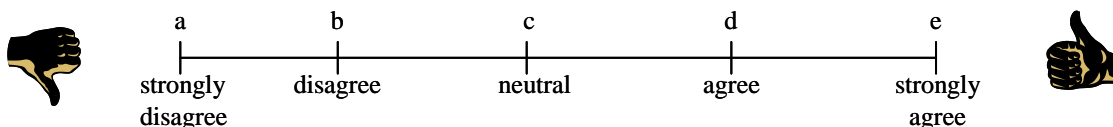
6. When my teacher assigns a math problem, there is usually only one correct way to get the answer.

a	b	c	d	e
strongly disagree	disagree	neutral	agree	strongly agree
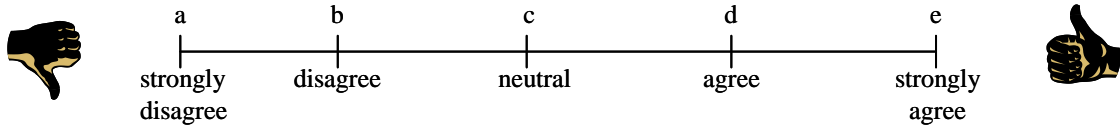
7. Knowing math will help me earn a living when I grow up.

a	b	c	d	e
strongly disagree	disagree	neutral	agree	strongly agree
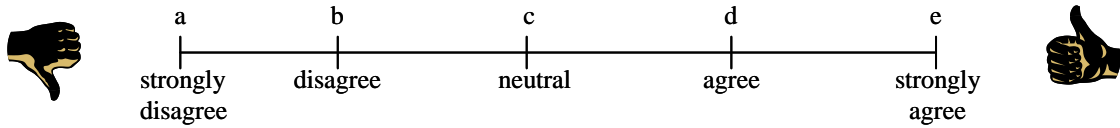
8. Learning math is a waste of time.

a	b	c	d	e
strongly disagree	disagree	neutral	agree	strongly agree

9. I like math.

a	b	c	d	e
strongly disagree	disagree	neutral	agree	strongly agree
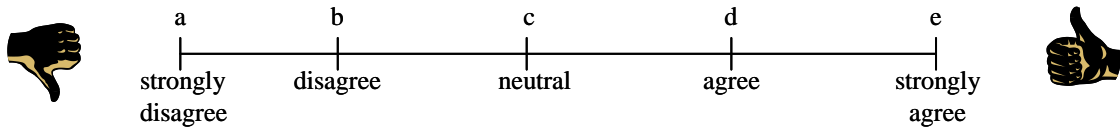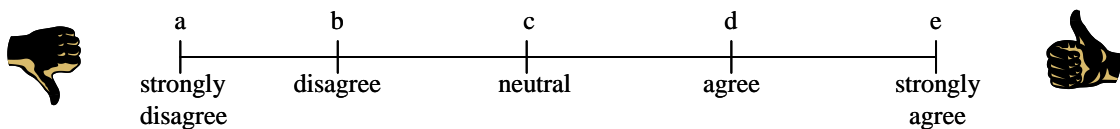
10. I will not use math when I am an adult.

a	b	c	d	e
strongly disagree	disagree	neutral	agree	strongly agree
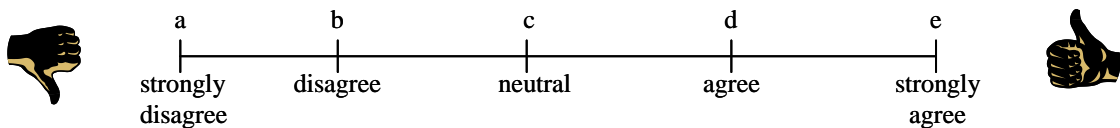
11. I try my best to solve hard math problems, even when it takes a long time.

a	b	c	d	e
strongly disagree	disagree	neutral	agree	strongly agree
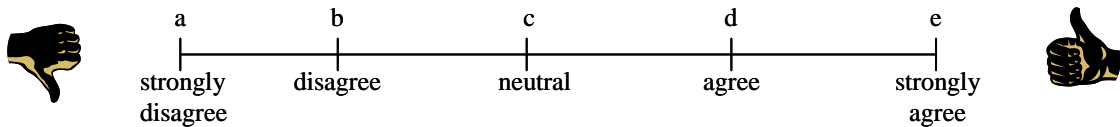
12. Doing math makes me feel stressed and nervous.

a	b	c	d	e
strongly disagree	disagree	neutral	agree	strongly agree
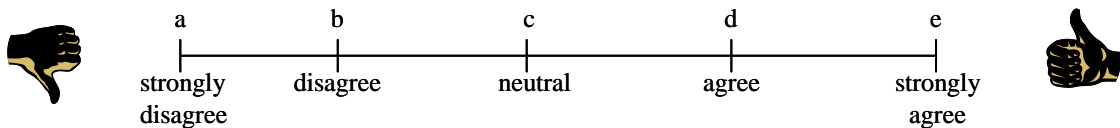
13. Girls can do just as well as boys in mathematics.

a	b	c	d	e
strongly disagree	disagree	neutral	agree	strongly agree
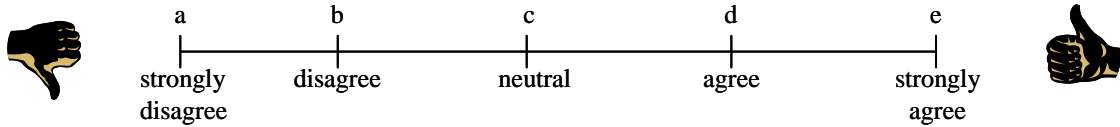
14. My teacher thinks that I can do well in math.

a	b	c	d	e
strongly disagree	disagree	neutral	agree	strongly agree
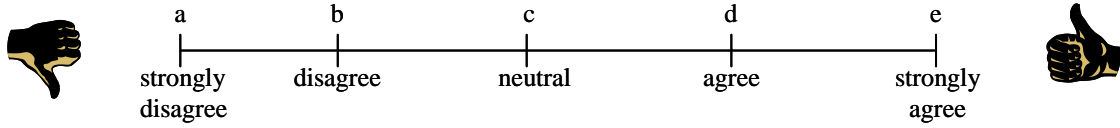
15. Compared to other subjects in school, math is hard for me.

a	b	c	d	e
strongly disagree	disagree	neutral	agree	strongly agree
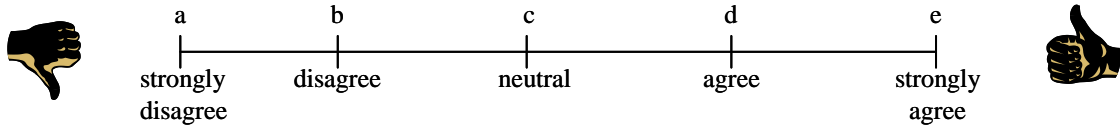
16. It would be a great thing if people thought I was good at math.

a	b	c	d	e
strongly disagree	disagree	neutral	agree	strongly agree
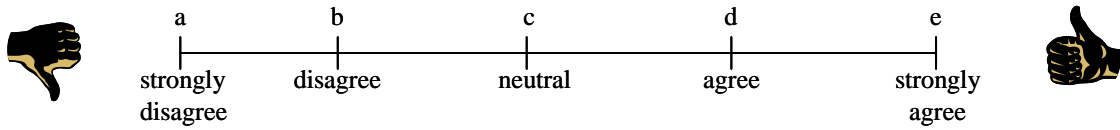
17. It's hard to believe that a woman could be a genius in mathematics.

a	b	c	d	e
strongly disagree	disagree	neutral	agree	strongly agree
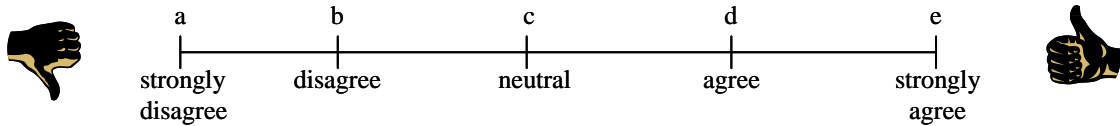
18. If I am working on a math problem and I'm not sure what to do, I usually stop trying.

a	b	c	d	e
strongly disagree	disagree	neutral	agree	strongly agree
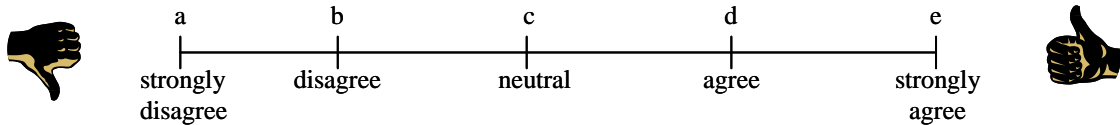
19. It is important to my parents that I do well in math.

a	b	c	d	e
strongly disagree	disagree	neutral	agree	strongly agree
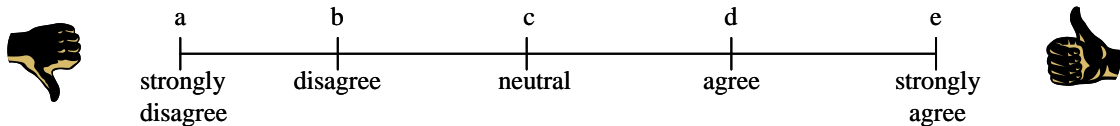
20. I don't like my friends to think I'm smart in math.

a	b	c	d	e
strongly disagree	disagree	neutral	agree	strongly agree
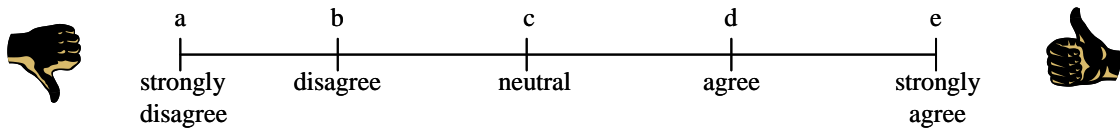
21. My parents think that I can do well in math.

a	b	c	d	e
strongly disagree	disagree	neutral	agree	strongly agree
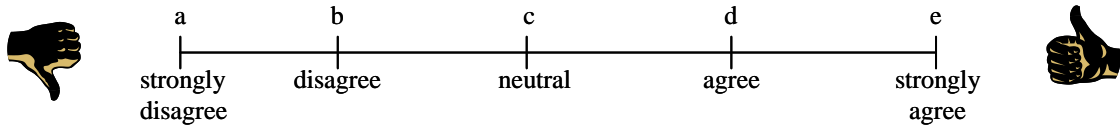
22. People who solve problems the fastest are the ones that are the best at math.

a	b	c	d	e
strongly disagree	disagree	neutral	agree	strongly agree
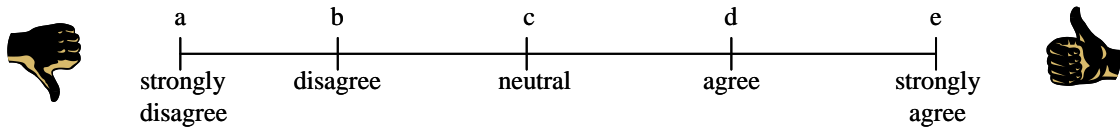
23. I don't like to work hard when I'm doing math.

a	b	c	d	e
strongly disagree	disagree	neutral	agree	strongly agree
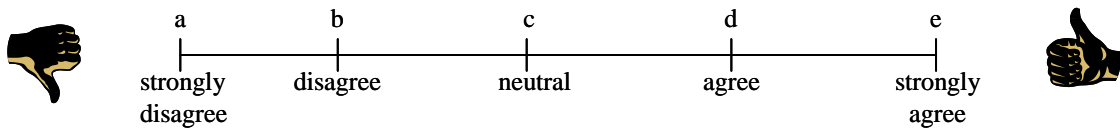
24. Math is one of my favorite subjects in school.

a	b	c	d	e
strongly disagree	disagree	neutral	agree	strongly agree
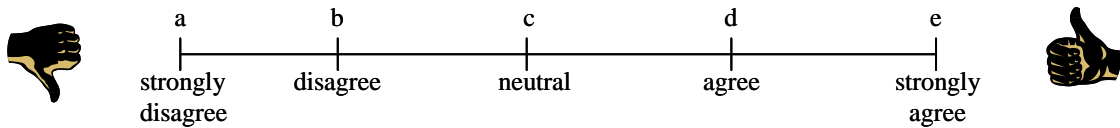
25. It is important to my teacher that I do well in math.

a	b	c	d	e
strongly disagree	disagree	neutral	agree	strongly agree
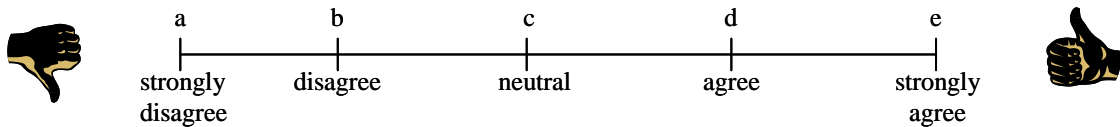
Appendix 7:

MATH PARTNERSHIP GRANT PROGRAM II, SUPPLEMENTAL #1 GRANT

# Evaluation Findings from Workshops Funded by ESMC II Supplemental Grant #1

As part of its external evaluation of the Eastern Shore Math Consortium grants, Macro International collected data from participants in two workshops funded by a supplemental grant received by the Consortium. The following is a summary of evaluation findings from these two workshops.

Dan Mulligan Workshop on Special Education

Sixteen MSP participants attended the Special Education workshop conducted by *Simply Achieve's* Dan Mulligan, which was held on June 19, 2008. Macro International administered an online survey in the middle of October to assess the quality and impact of the event.

All of the participants "strongly agreed" that the workshop was helpful and relevant, a wise use of their time, high quality, and engaging. All but one participant (92%) also "strongly agreed" that the session was well organized. Figure 1 summarizes these results.

Figure 1: Participant attitude towards Dan Mulligan Workshop (N=13)
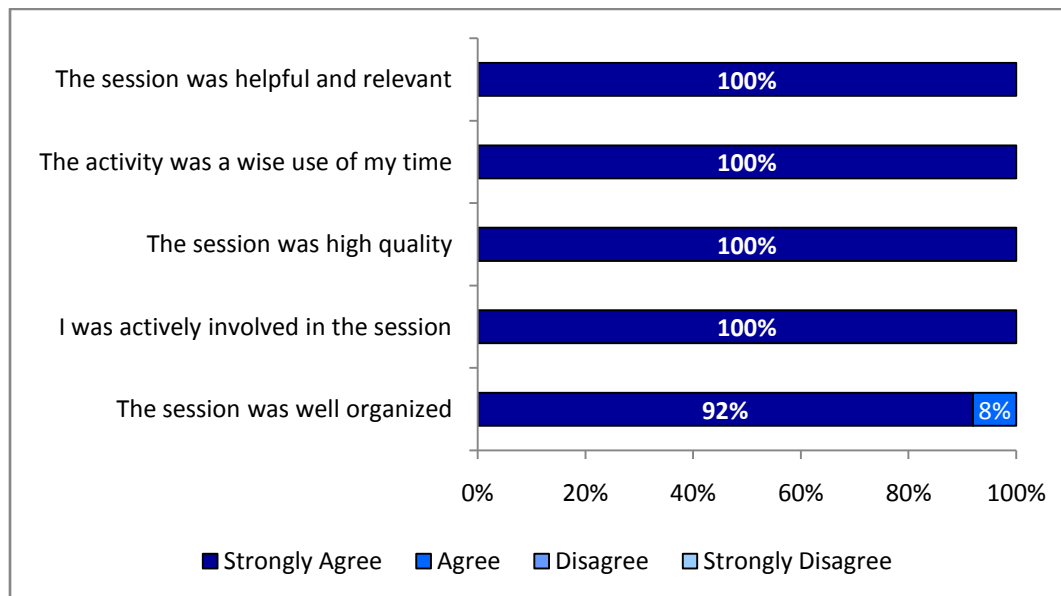
Four participants identified the Dan Mulligan workshop as the most valuable activity of the ESMC grant. Many of the participants also said that they would definitely attend another workshop by Dan Mulligan.

The survey also asked participants to explain how they have applied what they learned through the workshop thus far in the school year. The following are the most specific applications that participants cited:

- "I am currently using some of the <u>differentiation strategies</u> (e.g., Pyramid Trivia, Interactive Notebook, Vocabulary Cards, Choice Boards) in my 7th grade class."
- "Dan provided keen awareness and insight to <u>help address issues concerning high expectation for low achievers</u>. This has made me more conscientious of my own expectations for low achievers and made me more aware of what I can do to maintain high expectations."
- "I have used the <u>Frayer Model</u> to help students with vocabulary activities."
- "I have used the <u>strategy for the notebooks.</u>"
- "The workshop also gave me a <u>feeling of rejuvenation</u> for the profession."

The survey also asked participants to discuss what they considered the highlight of the workshop. Participants cited the following aspects of the event:
- Interactive notebook ideas & vocabulary ideas
- Ideas for higher level questioning
- New online games and templates to use in math
- "I was able to relate some of my own feelings from my own educational experiences. This validated my values to maintain high expectations for low achievers."
- "Dan gave us insight on what it is like to be a special education student."

According to the surveys, the biggest problem with the workshop was that they never received the facilitiator's Power Point slides. Several participants commented that they were told not to take notes so that they could be more engaged, but now they do not have the resources they need to apply the tools.

Participants also made the following suggestions for future workshops by this same facilitator:
- Offer the opportunity to all content teachers in middle school
- Have another event in the Salisbury area
- Have CDs ready or have participants bring flash drives to download the info
- Provide handouts that explain the games instead of relying on the Power Point presentation
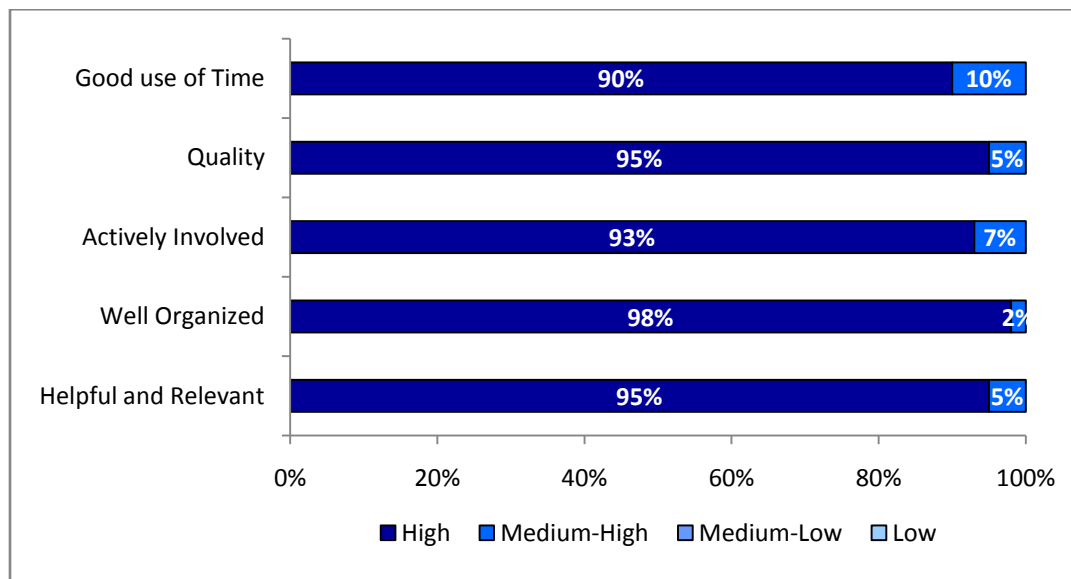
Kagan Workshops on Cooperative Learning

Kagan Workshop on Cooperative Learning #1: April 26, 2008

Forty-one ESMC participants attended the Kagan training on cooperative learning held April 26, 2008. Kagan staff administered a survey to collect feedback on the workshop and sent the surveys to Macro for analysis.

The overwhelming majority of participants thought the training was helpful, relevant, well-organized, high quality, a wise use of their time, and engaging. Figure 2 summarizes these results.

Figure 2: Feedback on Kagan Workshop #1, April 26, 2008

The participants also wrote in the following comments about the training.

- The seminar was "wonderful" or "great." (13 participants)
- We should have another day of training (8 participants).
- The session was relevant and useful (8 participants).

Kagan Workshop on Cooperative Learning #2: July 19, 2008

Due to the abundance of positive feedback from the first Kagan workshop, ESMC organized another Kagan workshop on the topic of cooperative learning and secondary mathematics. Twenty-five ESMC participants attended this workshop, which was held on July 19, 2008.

All of the 22 participants indicated that the workshop was "strong," which was the highest possible ranking on a scale from 1 (weak) through 5 (strong). One participant commented that

this was one of the best trainings (s)he had ever been to. Other words that participants used to describe the workshop included "helpful," "awesome," and "great." One participant said, "The ideas were very practical and I can't wait to implement them in my classroom." In addition to being usable, nine participants also thought the information and ideas were relevant and valuable. Seven participants also appreciated that the instructor included and modeled structures during the workshop.

Participants also commented on the instructor's personality and teaching skills. Participants noted that the instructor was particularly "good," "energetic," and "knowledgeable." Figure 3 summarizes the frequency of her attributes that participants mentioned in the survey.

Figure 3: Feedback on the Instructor for Kagan Workshop #2, July 19, 2008 (N=22)